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1.—*Minute of the Right Honourable the Governor of Madras, Nov.* 1828.

I HAVE the honour to submit to the Board some documents, which I have had under consideration for a short time past, connected with the trade and navigation of these territories, in the hope that something further may be done for the improvement of both. With this view, I have examined the details of our imports and exports for the last twenty five years, and I am happy to find the result more favourable than I had anticipated. It is, however, only to a portion of this trade that the proposition I have to submit extends. It now passes by a very circuitous route round Ceylon, and down, at most seasons of the year, eight degrees beyond the equator. To avoid calms upon the line, and in order to weather the island of Ceylon, the Maldiva archipelago, and the Chajos archipelago, a vessel sailing during the south-west monsoon, between Madras and Bombay, performs a voyage of five thousand miles, although the real distance by sea does not exceed fifteen hundred miles. This source of expense and loss of time is severely felt, even upon this portion of the trade of this coast; and it must also press with some weight upon the trade between Calcutta and the other coast.

My attention was first called to this subject when I was in charge of the southern provinces thirty years ago, and had under

me that narrow channel which separates Palk's Strait from the Manar Gulf by a passage of not half a mile broad, called the Pass of Paumbum. At that time I heard regrets continually expressed by a long and much revered resident and officer, Colonel Manuel Martinez, that the trade of the two coasts of Coromandel and Malabar, and of Bengal, should be so much obstructed by this shallow channel; always accompanied by the expression of his sanguine hopes that something would be done, and he thought it could be easily done, to open it. The opinion of a person distinguished as Colonel Martinez was for a strong understanding and the purest intentions, led me to this spot shortly before I left the southern countries; and, to my eye, the undertaking did not appear one of great difficulty. The calmness of the sea at some periods of the year, the quality of the stone which intersects the passage, and the presence of a large population of divers upon that part of the coast, seemed to offer peculiar facilities to the removal of a portion of this great obstruction to the navigation and commerce of our territories.

Nothing, however, was done until 1822, when Colonel De Havilland recommended to the Marine Board a regular survey of the passage, from the opinion he had also formed, from local recollection, that it might be improved without very great expense; and he proposed that inquiry should be made to ascertain if the advantages contemplated, in the event of success, were of such importance as to render any measure towards it advisable.

This letter was addressed to the Marine Board, who consulted Mr. Sullivan, the commercial resident at Tinnevelly, for the purpose of obtaining this information. Mr. Sullivan declared it to be his opinion, founded on the several opportunities he had had of observing the passes, from a residence of nearly fourteen years on that part of the coast, that the removal of the rock nearly in the centre of one of the passes might be effected with very little difficulty, and at a trifling expense, so as to admit of craft pursuing their voyage without the necessity of unloading and reshipping their cargoes; and that, in the event of this obstruction being removed, the other pass might hereafter be cleared also. Fortified by this opinion, the Marine Board deemed the object in view of considerable importance to the shipping and commercial interests, and recommended to the Government that the passes should be accurately surveyed and reported upon by a professional officer.

In September, 1822, Ensign Cotton, of the Engineers, made his report to Captain Fullerton, the civil engineer in the southern division, by whom it was transmitted to Colonel De Havilland, for such further instructions as the information afforded by this report might suggest.

Ensign Cotton's report is a detailed account of the nature of the pass, of which the most remarkable passage is this :—

"The whole length of the dam, from Paumbum on the east to Point Ramen on the west, is 2250 yards, or about one mile and a quarter. At the east end, the rocks are two or three feet above water for the first 300 yards. The rocks on this part bear every appearance of having been placed there by art, though they are of very large dimensions, some of them being from ten to twenty tons. Between the distances of three and eight hundred yards from the east end, no rocks appear above water, though, for the most part, they are very near the surface. The dhonies pass the line of rock at a place near the middle of the opening, which is above thirty-five yards broad, and has six feet and a half of water over it at high tide, and four at low water. From the opening to the west end of the dam, the rocks appear above water for the whole distance, at first irregularly and in detached masses, and afterwards forming a continued ledge, of five or six feet above water. There is a small opening in the rocks about four hundred yards from the main opening, which however is not used by the dhonies. The dam in this part is evidently formed of the natural rock, which is in a state of decay, and appears to be of a very different nature from that at the east end. The natives say, that the east end of the dam is artificial, and that it formerly reached across from shore to shore, but was burst by the violence of the water, the bottom, in the shallow part, being formed of the fragments. The boatmen brought up some pieces of rock from the bottom, which were of the same nature as the stones of which the east end of the dam is composed.

"About three hundred yards from the northern line of rocks, the dhonies re-ship their cargo and proceed; for though there are rocks farther north, there is plenty of water on the course they steer. I could not ascertain from the boatmen that there was either more or less water in the pass at any other season of the year, but they all agreed that the weather was more calm in January and February, and that the water was so smooth and clear in those months, that they could see every pebble at the bottom; there is, therefore, no doubt that that would be the best time of the year for any future operations. Indeed, it would be very difficult to form any idea of the means it would require to remove the rocks without having first ascertained the exact nature of the bottom."

Upon receiving this report, Colonel De Havilland instructed Captain Fullerton to proceed to Ramisseram, to examine the Paumbum Passage; and, on the 5th of December, 1822, that officer reported the result of his examination to the Inspector-General of Civil Estimates.

Lieutenant-Colonel Caldwell, having succeeded Lieutenant-Colonel De Havilland, transmitted Captain Fullerton's report to the Government on the 8th of February, 1823.

The report of Captain Fullerton is also highly favourable to the attempt. He says, "From an attentive examination of the Pass itself, as well as from information obtained from the pilots and boatmen at Paumbum, I am led to conclude that it might be very considerably improved at a comparatively trifling expense." Captain Fullerton states at length all the grounds of this opinion; and Colonel Caldwell, in forwarding it, says, "The civil engineer judiciously declines pledging himself for the truth of his estimate of the expense (one lack and a half of rupees), which he terms a 'mere approximation to the probable cost,' at the same time he appears to entertain no apprehension of the impracticability of the project; and I am disposed to be persuaded, under a careful consideration of local and prevailing circumstances, together with the several particulars detailed in his report, that he is justified in this confidence,—an opinion which I beg at the same time to qualify by the further remark, that success will materially depend upon having the command of ample means, and the possession of such resources as will enable the executive officer to have recourse to expedients of a higher class and superior power in their operation and effect than may have been contemplated at the outset of the undertaking, and which will possibly considerably increase the ultimate expenditure."

The season of the year when any experiment could be made having passed when this report was received, nothing was then done; and all the means and men at the disposal of this Government having been required in succeeding years to bring the war in Ava to a successful issue, the subject has not been since resumed.

Having carefully perused and considered all the documents upon this interesting subject, I thought it right, some months ago, to consult the chief engineer, Colonel Garrard, and the Inspector-General of Civil Estimates, Major Sim; and finding their sentiments entirely accordant with those of Lieutenant Cotton, Captain Fullerton, Colonel De Havilland, and Colonel Caldwell upon the practicability of this undertaking, I feel it my duty to recommend that measures be taken for bringing it to a practical test; and I propose therefore, in addition to the orders already issued, that the Inspector of Civil Estimates be instructed to proceed with the Company's anchor-boat, and a small schooner to be purchased for fifteen hundred rupees, as soon as the season shall open, for the purpose of making an experiment in blasting and removing a part of the rock. His highness the Prince Mucktar has also placed at my disposal, for the same service, a yacht belonging to

the Nabob, and her services may be accepted, or not, as may be necessary.

The trial can be made at a trifling expense, and the result reported for our further consideration and decision. In the mean time, it will be satisfactory to the Board to know that the Bombay Government, and especially the superintendent of the marine there, Sir Charles Malcolm, enter warmly into this undertaking as one of the very greatest importance to the general coasting trade between the two coasts, and have offered the use of a cruiser to assist in surveying the approaches to the Pass, and in whatever other services she can be useful.

This offer I propose to accept, if the experiment to be made by Major Sim shall promise the success I anticipate from it, being entirely of Colonel Caldwell's opinion, that success will materially depend upon the executive officer having the command of ample means, and a trial so conducted upon a small portion of the rock will speedily set the question at rest.

The period I regard as peculiarly encouraging to the attempt, for if it should hold out reasonable assurance of success, there will, I anticipate, be no difficulty in making an arrangement with the Zemindar of Ramnad, to whom the land bordering on the Pass belongs, and whose country is about to be restored to him, that the expense shall be defrayed from the surplus of his revenues now in deposit, about five lacks of rupees, he being allowed the produce of a small toll upon passing vessels in proportion to his capital expended. In addition to this pecuniary return, the whole of his country will derive great benefit from the improvement of the Pass, also Shevagunga, Tanjore, and especially the island of Ceylon, the whole coast of Tinnevelly, the states of Travancore, and Cochin, and all the Company's provinces up to Bombay. A moderate duty will, therefore, be cheerfully paid in return for the delay and hazard avoided, as well as the expense and injury actually saved, for I find that the expense of unloading and reloading a common dhoney amounts to thirty-five rupees at the Pass of Paumbum each trip, exclusive of the damage to the cargo from such an operation performed on the open sea.

Amongst the minor benefits, if it should succeed, may be reckoned an easier and quicker access to the Neilgherries, for I have now ascertained, from the report of the collector of Malabar and the surveying officer, Captain Ward, and Colonel Cullen, that a good tide river (the Beypoor near Calicut) may even now be navigated within seventy miles of Ootacamund, the principal settlement on the Neilgherries, with the prospect of extending the navigation farther up; and the whole of this route will be per-

fectly practicable after the pioneers have completed the remaining three miles and a half of the Carcoor Pass, upon which they are to be immediately employed. This road to the hills opens prospects of the greatest interest to the Company, as well as to invalids; for besides the magnificent forests of timber, both of teak and pron (the latter large enough for mainmasts to a 74-gun ship), growing close upon the boders of the river, gold-dust, though as yet found in small quantities, is dug from the sides of the mountains, and collected in the streams of a fineness exceeding British standard gold, thirteen and three-quarter grains, and equal in value to any imported from the eastern islands. I have great pleasure in submitting to the Board the result of an analysis of the gold-dust by the assay-master at the presidency; and I recommend that these specimens be forwarded for the information of the Honourable Court of Directors, together with copies of all former papers connected with the survey of this Pass, or tending to convey any information of the actual state of the navigation in Palk's Strait and the Manar Gulf. My own recollection enables me to speak with confidence of the practicability of navigating the former with a ship of a thousand tons within a mile or two of the Pass of Paumbum; and the fact of a small English cutter going frequently through the Pass in the year 1799, is also within my own knowledge.

The exact depth of water in the approaches on the southern side of the Pass I have not been able to ascertain with any accuracy; for although the native Serangs who navigate the large dhonies to this port are eloquent enough in describing the hard knocks they now receive in going through the Pass, the heavy expense they incur, and the damage which their cargoes sustain in unloading before they can go through, and in reloading on the other side, they cannot speak with any confidence of the exact depth of water any where but in the narrowest part of the Pass. It will be necessary, therefore, that this part be accurately surveyed before any progress is made in the work, that the removal of the rock may keep pace with the depth of water in the approach to it; and it may be fairly inferred, that if the channel through the rocks were once well opened, the currents would probably clear away the sands.

In this matter, however, caution and science will be necessary; and on these grounds I feel that the experiment cannot be in better hands than those of Major Sim, Inspector of Civil Estimates.

(Signed) S. R. Lushington.

November 25, 1828.

2.—*Major Sim's Report.*

THE distance between Point Ramen, or Tonnetory, in the Ramnad province, and the opposite coast of Ceylon, is about sixty-two miles. In the intervening space are situated the islands of Ramisseram and Manar, separated from each other by the bank called Adam's Bridge, and from the coasts of Ramnad and Ceylon by the narrow channels or straits of Paumbum and Manar.

The Manar channel is about a mile in breadth, and separates the island of Manar from Ceylon. It is navigable for small dhonies only, and country boats. The island of Manar, which is a dependency of Ceylon, extends about twenty miles across the Straits in a north-west direction. At its west end commences Adam's Bridge, which runs about thirty miles also in a north-west direction to the island of Ramisseram. This island is about ten miles in length, and is separated from the coast of Ramnad by the channel of Paumbum, a mile and a quarter in width.

The Manar channel was surveyed, under instructions from the Ceylon government, by the late Captain Dawson of the Royal Engineers, and Mr. Stewart, the master-attendant of Columbo, who describe it as a long, narrow, and very winding channel, having about six feet of water in the shallow parts, with the exception of a bar opposite to its south end, on which there is not more than three or four feet of water. This channel, from the account given of it by the officers who surveyed it, does not appear to be capable of any material improvement.

The bank of Adam's Bridge is a very extraordinary formation. It is only about a quarter of a mile in breadth, and consists entirely of sand, partly above and partly below water, collected apparently by the surf and currents, and unsupported, as far as could be ascertained, by rock. The east end of it was pierced by the Ceylon officers to the depth of thirty feet, and nothing found but sand. On each side of the bank, at the distance of two and a half or three miles, the sea is six fathoms deep, and quite free from obstructions of every kind.

There are three principal openings or channels across the bank: one near the island of Manar, called the Tal Manar Passage; the second eight miles farther to the west; and the third, about eleven miles from the island of Ramisseram, termed the Tanny Coody Passage. This last was examined and surveyed on the present occasion. It is narrow in the centre, and thirty feet deep, with broad curved bars opposite to its two ends, on which there is not more than five or six feet of water. The bank between it and Ramisseram is entire, and several feet above water. The Tal Manar Passage was examined by the Ceylon officers, and re-

sembles exactly that of Tanny Coody, but is not so deep, there being only about three feet of water on its northern bar. The intermediate opening was not examined; but from its appearance, as well as from the description given of it by the fishermen who frequent the place, there can be no doubt of its corresponding very nearly with the other two. It is said to be rather deeper than the Tal Manar Passage, but not quite so deep as that of Tanny Coody.

In the vicinity of the Tal Manar and Tanny Coody openings the bank is visible above water for several miles, intersected by only a few narrow openings, but towards its centre it is chiefly covered with water, and very little sand is to be seen, though, from the surf breaking exactly on the line of the bank, the depth of water cannot exceed a few feet.

During both monsoons, on the lee side of the bank, to the distance of from half a mile to a mile, there are a great number of irregular shifting sand-banks scattered about, on which there are from two to four feet of water, with passages between them, eight or nine feet deep. The weather side, on the contrary, particularly towards the end of the monsoon, is, in a great measure, clear of such banks, and the surf breaks on its shore nearly in a straight continued line. When the monsoon changes, the strength and prevailing direction of the currents change too, and the loose sand, of which the shifting banks are composed, on what was the lee side, being stirred up by the surf and sea, is swept by the current through the channels, and deposited on the opposite side, partly on the bars, and partly on loose detached heaps along the bank. These deposits appear to be further increased by the sand thrown up on the weather shore by the surf, which, as soon as it becomes dry, is carried by the wind across the bank into the sea on the other side. It was observed, when the wind was tolerably strong, that a continued stream of sand was swept across the bank into the sea on the lee side. The beach of Adam's Bridge, therefore, to the distance of about a mile on both sides, is continually changing and shifting. On the weather side it is generally clear, except immediately opposite to the channels where there are always projecting bars, while, on the opposite side, there are many loose banks scattered about, and constantly changing and varying in position and extent as the monsoon advances, and according to the state of the sea and weather.

During both monsoons, rather a high surf breaks on the weather side of the bank, but the south-west monsoon produces much the highest surf, accompanied by a long heavy swell. During part of the north-east monsoon, the surf breaks on both sides of the bank.

Dhonies in ballast and fishing-boats occasionally pass through

the openings in fine weather, but the passage is attended with some difficulty and danger, and is not common.

There is an account, I was informed, given in the records of the Dutch government of Ceylon, of a Dutch fleet having, on one occasion, escaped from a Danish fleet by passing through the channels of Adam's Bridge. If this be authentic, either some of the channels must have been deeper in former days, or the ships must have been of a small size. It is probable, indeed, that the depth and extent of the openings are constantly changing from the effect of the currents and surf, and the quantity of loose sand about the bank, and that they will not be found of the same size for any length of time; they appear to be affected by every change in the weather, the currents and surf, and most likely vary considerably in different seasons.

If it be possible to obtain any where through the Straits a channel sufficiently deep for all classes of ships, it must, I think, be sought for in some part of this bank; and even here the practicability of opening such a channel, and of keeping it open, is very doubtful. A strong double bulwark of stones across the bank, extending into deep water on both sides, with a narrow opening of one hundred or two hundred feet, might, I think, with reason be expected to accomplish the object. The velocity of the current would probably keep a narrow fixed channel of that description always sufficiently deep, and sweep off any sand that might be carried into it either by the sea or by the wind; and as the bulwark would extend into deep water beyond the shifting sands and the influence of the surf, there would be *little risk*, I think, of its ends being filled or choked with sand. The danger to be chiefly apprehended is the formation of bars opposite to the ends of the channel, similar to what are now found in front of the natural openings, particularly on the south side, where, from the superior strength of the south-west monsoon and heavy swells, sand-banks are always the largest and most numerous; but of this I think there would not be much risk: the quantity of sand carried through the channel, from its being beyond the influence of the surf, would probably not be very great, and as the current would be rapid and extend into deep water, it is likely that what did pass through it would be dissipated, and disappear.

The cost of such a work would, however, be very great indeed, and could only be justified by its being considered an object of high national importance to have a passage sufficiently deep in time of war for the largest vessels. In the event of a struggle for the superiority at sea with an European enemy, the advantages of such a channel would be invaluable; but it is doubtful whether the benefits which commerce would derive from it, great as they undoubtedly would be, would warrant an undertaking, the expense

of which, under the most favourable circumstances, must be very large, and the success, from a variety of causes which neither can be foreseen nor guarded against, uncertain.

There remains to be considered the Paumbum Channel or Strait between Ramisseram and the Ramnad coast, which affords perhaps the only prospect of a moderately deep channel, such as would benefit commerce generally, and the coasting trade of India in particular, without the necessity of incurring a very large or disproportionate expenditure.

The examination of the Paumbum Passage has accordingly, and in conformity with the instructions of Government, occupied the whole of the attention and time of the officers deputed for the purpose of surveying the Straits, with the exception of a few days devoted to the inspection of Adam's Bridge.

The obstacles to be overcome at Paumbum are a dam or ledge of rock extending from the island of Ramisseram to Point Ramen or Tonnetory, on the opposite coast of Ramnad, and an irregular sand-bank a little to the south of it, the exact situation and shape of which will be readily understood from an inspection of the accompanying maps, on which the dam and sand-bank, with the soundings in their vicinity, are minutely and accurately expressed.

The dam is 2250 yards in length, and runs east and west. It is bounded by two parallel ridges of rock, about one hundred and forty yards apart. The north ridge is considerably the highest, and is termed the first or great dam. It is in most places visible at low water, though nowhere sufficiently connected to prevent entirely, at any time, the passage of the water. The line of the south ridge or dam can also be distinctly traced at low water, but only a few detached rocks on it even then appear above water. The whole or greater part of the space between these two ridges is filled up by large irregular masses of rock, in various positions, but generally in directions nearly parallel to the principal ridges, and usually several feet lower than them.

The continuation of the rock or dam can be readily traced on the main land and island of Ramisseram, in its natural position, and in uniform layers, having a small inclination to the south, preserving exactly the same direction, but on both sides several feet higher than the dam. The ridges which form the dam are very much broken and displaced, and now consist of large flat masses of rock, seldom more than two or three feet in thickness. Their shattered state, and the break or chasm which they form in the general height of the stratum of rock, clearly indicate that the island of Ramisseram was at one time connected with the main land, and that it has been separated, in the first instance, by the sea, during storms breaking over and bursting the chain of rocks which joined them; and, afterwards, by the water undermining

and displacing the broken fragments. This supposition is confirmed by the records of the Pagoda of Ramisseram, which relate that, until the early part of the fifteenth century, the island was connected with the continent by a narrow neck of land; and that the Sawmy of Ramisseram was carried across to the main land three times every year, on particular festivals. During the reign of Achoodapah Naig, rajah of Madura, about the year 1480, a small breach was made, by a violent storm, in the land which formed the junction; but as there was no great depth of water on it, travellers continued to cross on foot till the time of his successor, Vessoovanada Naig, when the breach was much enlarged by a second storm. The opening was filled up and repaired, to facilitate the passage of the pilgrims to the Pagoda of Ramisseram; and the repairs lasted about ten years, when a third hurricane destroyed them, and greatly extended the breach, after which no attempt was made to fill up the chasm. Since then, every succeeding storm has assisted in destroying and undermining the dam; and the inhabitants believe that its destruction is still proceeding, and that fifteen or twenty years make a sensible alteration in it. They state that a storm occurs generally once in that period, and always displaces and washes away a portion of the rock.

Besides the ridges of rock which constitute the dam, and which, as already stated, are about one hundred and forty yards in breadth, rocks and stones, mixed with sand, form the bottom, to a distance of about eight hundred yards on the north side of the dam, and two hundred yards on the south side. Beyond eight hundred yards, the bottom to the north consists of mud and clay, with fourteen feet of water; and on the south side, beyond the rocks, it is soft mud and sand.

From a careful examination of the ground on the north side of the dam, by means of iron probes, and from the appearance of the beach on the Ramisseram and Ramnad coasts, it is probable that no connected layers or beds of rock extend farther than one hundred and fifty or two hundred yards from the dam; and that beyond this distance, the bottom consists of detached fragments of rock and stones, mixed with hard gravel and sand. The bottom on the south side is similar, being composed partly of beds of rock and partly of loose fragments.

The ledges of rock which form the dam, and the strata on both sides, have been pierced and blasted in a great many places, and considerable quantities of the rock removed, for the purpose of ascertaining its quality and depth, and the nature of the ground beneath. The rock of the dam is considerably harder, as well as thicker, than what is found on either side, but the whole is soft and easily pierced and broken. It appears to be a sandstone of a soft description, and generally in an advanced stage of decay,

varying in thickness from one and a half to four feet, and resting on a bed of rough gravel. It is hardest at the surface, and becomes softer and coarser towards the bottom; which last has more the appearance of indurated gravel than of rock. The rock to the north and south of the dam seldom exceeds one and a half or two feet in thickness, and is in a very decayed state.

The several strata are found in their natural position on the island of Ramisseram and on the opposite coast; and a number of wells having been sunk through them by the inhabitants, the quality and thickness of the rock are easily examined there, and correspond exactly with the preceding description.

In the dam there are two channels, one about five hundred yards from the eastern end, which is termed the large channel or river, and through which alone vessels at present pass. The small channel is three hundred yards from the west end of the dams; it has only three feet of water on it, is very narrow and full of rocks, and is in consequence only used by canoes and boats. The principal passage is about fifty yards broad, and is of very irregular depth, with a rocky bottom. In some places it is not more than two and a half feet deep at low water; but there is a very winding narrow channel through it, just sufficiently broad for the passage of a dhoney, and nowhere less than five and a half feet deep at high water, ordinary tides. This channel, from its very winding course and little depth of water, is exceedingly inconvenient, and occasions great delay and considerable expense to vessels passing through it. There is often a rapid current and heavy swell, and, unless in very moderate weather, no vessels drawing more than four or four and a half feet of water venture through it; and in rough or stormy weather it is often, for several days, altogether impassable.

The passage has always been confined to dhonies and other small vessels, chiefly belonging to the native merchants. These, when coming from the northward, anchor eleven or twelve hundred yards from the east end of the dam, in sixteen feet of water, soft mud. There they unship cargo till their draught of water is reduced to four or five feet, according to the state of the weather, and then drop or warp through the channel, as the wind or current are favourable or otherwise. After passing the channel, they anchor a second time, about four hundred yards below the dam, in twelve feet of water, and re-ship cargo till they draw about six feet. They then proceed to the southward, and cross the sand-bank already referred to, about 2700 yards below the dam, and on which there is not more than seven feet of water when the tide is full. As soon as they cross the bank, they anchor for the third time, to re-ship the remainder of the cargo, and then continue their voyage. These operations usually occupy

three or four days, even under the most favourable circumstances; when the weather is stormy the detention is considerably greater, for the pilots will not then undertake to carry any vessel through the passage; and if this happens during the north-east monsoon, the vessels are obliged to remain at anchor, to the north of the dam, in an open situation, exposed to the risk of being driven on the rocks to leeward. Moreover, when ten or twelve dhonies arrive together, which is often the case, the last are occasionally detained for a very considerable period; for as they can only pass when the weather is moderate, and then only three or four during one tide, owing to the crookedness of the channel, it may happen that the whole number are unable to get through while the wind and sea continue moderate, and the last arrivals are obliged to wait ten or twelve days longer for another interval of fine weather.

The expense attending the passage of the channel, and the bank below it, varies from ten to forty rupees, according to the size of the vessel; and when the detention and risk of damage are taken into the account, the whole must form a heavy burden on the coasting trade of the country, and greatly retard its extension and improvement.

The removal, therefore, of the existing difficulties and obstructions, and the improvement of the channel, so as to facilitate the passage of the vessels which now use it, and at the same time to admit of its being navigated by ships of a larger size and superior description, is an undertaking of much importance, and highly deserving of attention.

From the preceding remarks, and from an inspection of the chart, it will be seen, that the removal of the rock which obstructs the channel, though that alone would be an improvement of much value, would not remove the whole of the difficulties at present experienced in navigating the Paumbum Channel; for after passing through the rocks, there still remains a sand-bank to be crossed, on which there is not more than seven feet of water at high-water, ordinary tides. The removal of this bank, it is to be feared, may prove a very difficult part of the undertaking; at all events, the success of any measure adopted for the purpose is much more uncertain than if rock formed the obstruction, for where that is met with, its removal can always be calculated on with certainty, though the expense may in some cases be great. The bank, it is probable, consists chiefly of the earth and sand which composed the narrow neck of land that formerly connected the main land and island of Ramisseram, and of the sand washed out of the deep channels beneath, and to the south of the dam, by the rapid currents over it and through its openings. On the

breaking up of the stratum of rock which formed the junction, the loose sand on which the rock rested, and which was protected by it, would, on being uncovered, be swept away by storms and by the rapid currents flowing through the openings and interstices among the broken fragments. These currents, after passing the rocky barrier and reaching the open space to the south, spread and lose their velocity, and being at the same time met by opposing currents from the east and south-west, the sand washed from among the rocks is deposited in the place now occupied by the bank, where the water is comparatively still and smooth, being protected to the north by the dam, and on the south side by a chain of small islands.

The stream through the principal opening is extremely rapid at times; and as soon as it escapes from the rocks, and reaches the soft sandy ground, it has, as will be seen, scooped out for itself a deep and extensive channel, to the distance of upwards of a mile and a half. The sand from this channel, thus thrown up and deposited at its sides, and also to the southward, where the stream by spreading and meeting with opposing currents loses its rapidity, has no doubt contributed to the formation of the bank. It does not appear, however, that this is now subject to any material alterations or changes; the pilots state, that the depth of water has not altered within their memory, as far as they can judge; and the irregularity of the soundings, which often vary from one and a half to two feet in a very short distance, together with the quality of the bottom, show that the sand is not frequently shifting as at Adam's Bridge. Nor does there seem to be any reason for considerable changes. The bottom of the sea to the north is either rock or clay, and the currents from that direction appear to bring very little sand with them, for the water, during the north-east monsoon, is usually clear and free from mud or sand. Storms may produce material changes, and probably do; but whether these are permanent or not, there are no means at present of ascertaining.

A careful and attentive examination of the whole of the channel, between Paumbum and Point Ramen, suggests the three following plans for its improvement:—

1st. The present principal opening through the dam may be cleared of the rocks which obstruct it, and straightened, without increasing its depth.

2dly. The same opening may be deepened to eight and a half or nine feet at high water, ordinary tides; or another channel may be opened, of the same depth, in some other part of the dam, if considered more expedient. Or,

3dly. A channel, twelve or fourteen feet deep at high water,

may be formed, either through the dam or through the projecting point of land on the Ramnad coast, at the distance of about two miles west of Point Ramen.

1. From the description that has already been given of the channel through which the dhonies now pass, it will be evident that much difficulty and delay must have arisen from the crooked and winding shape of the channel. There were several turns in it, and one in particular where the current is the strongest, which increased the difficulty very much; and frequently, when the weather was rough, interrupted the passage entirely for several days at a time. It will be satisfactory to Government to know that these obstructions have been all removed by the small working party which was authorized to be employed for the purpose of assisting in the examination and survey of the passage, and the channel rendered quite straight, and also a little deeper than it was formerly. Dhonies now pass through it quickly, using only one warp instead of three or four, as they were obliged to do before the rocks were removed; and one or two keeled vessels, drawing about six feet of water, have sailed through. This alone is a very considerable improvement, for it will prevent much of the detention to the north of the dam, which has hitherto been unavoidable, and was always attended with danger; and will at the same time admit of vessels passing through, drawing a little more water than formerly, by enabling them to pass at high water when the tide is quite full. The party continues at work in the channel, and may be expected still further to improve it before the work is stopped by the monsoon.

2. The second plan, namely, opening a channel eight or eight and a half feet deep through the rocks, may be accomplished, I think, with most ease and least expense, at about thirteen hundred feet from the west end of the dam, where, it will be observed from the chart, there is seven and a half and eight feet of water, near the main dam on the north side, and within one hundred yards of it on the south side. The quantity of rock, therefore, to be removed, to obtain a channel of that depth, would not be very great, while, in its removal, much comparative facility would be experienced, in consequence of there being very little current or swell to interrupt or retard the work. For the main dam at that place is tolerably compact and entire, and there is consequently very little current in its vicinity. By allowing a part of the main dam to remain till the last to obstruct the current and swell, and by completing the channel on both sides before its removal, the greater portion of the work would be performed in comparatively smooth water, which is of very great consequence in blasting and weighing rock. The narrow part of the channel would also then be very

short, not exceeding one hundred and fifty or two hundred yards in length, which would be a great advantage to vessels.

The objections to it are, that the anchorage and channel would be more exposed to the strength of the wind and swell during the north-east monsoon than the present channel, which is sheltered, in some degree, by the west end of Ramisseram; and being farther removed from the eastern shore, the pilots would have more difficulty in communicating with vessels, and affording them assistance in stormy weather.

On the south side of the dam there is a projecting point of the sand-bank between the proposed place and the deep channel opposite to the principal opening, on which there is not more than from five and a half to six and a quarter feet of water at low tide. If this were to remain in its present state, vessels, after getting through the channel during the north-east monsoon, would be obliged to pass round the head of it in a direction across the current, which would evidently be attended with considerable difficulty to dhonies and country craft. But as this point of the bank is nearly in the direction which the stream through the new channel would take, it would, I have not the slightest doubt, be entirely swept away on the opening of the channel, for it seems to owe its existence to the absence of any strong current or stream in that part, in consequence of the compact quality of the dam there. The only real objection which I can perceive is its greater distance from the shore, and consequently greater exposure to the wind and swell during the north-east monsoon.

To deepen the present channel to the same extent would be a much more tedious and difficult undertaking. There, it will be seen, the shallow water extends to a much greater distance to the northward, for at six hundred yards from the dam the depth is only six and a half feet at low water. To obtain a channel of the desired depth, it would be necessary, therefore, to excavate and deepen not less than seven or eight hundred yards in length; while, at the former place, the distance does not exceed two hundred or two hundred and fifty yards. The difficulty of the operation also would be increased in a very great degree by the distance from the dam, the heavy swell which often prevails, and the rapidity of the currents. These causes would retard the progress of the work very greatly, and raise the expense proportionally, for where there is a heavy swell or rapid current, it is impossible either to blast or weigh the rock.

A large proportion of the space to be deepened, it is true, does not appear to consist of solid rock, but of fragments of rock and stones firmly fixed in sand or gravel, and covered with weeds. It is probable, from the appearance of the adjoining beach and

land, as has been already observed, that no large masses of rock would be found at a greater distance than one hundred and fifty or two hundred yards to the north of the dam, and that beyond that line the bottom consists of small pieces and fragments of rock, carried there originally by the current, and now firmly fixed in hard gravel and sand. These, generally, it would be unnecessary to blast, as, it is presumed, they are not too large to be weighed entire; but still much difficulty and inconvenience would be experienced in loosening and removing them, in an exposed situation, with a heavy swell, and in five or six feet of water. The bottom appears to be too compact and rough to be cleared and deepened by dredging, or by any similar means procurable in this country. A diving-bell sufficiently large to admit of two or three men working within it, with short iron crows and pickaxes, might be employed with great advantage, and would be highly useful. Divers, of whom there are great numbers in the vicinity, might also be used to assist in loosening the fragments with the same instruments, and afterwards in raising them into boats or catamarans, either with the hand or with windlasses, as circumstances might require. An operation of this kind, subject too, as it would be, to frequent interruptions from rough weather, would evidently be very tedious and expensive, and could not be completed probably in less than two or three years. But of its success I think there is no reason to entertain any doubt, and it certainly would be a vast improvement. It would be more convenient and useful than a channel of the same depth at any other place; and there would be this advantage attending the plan, that to whatever extent the improvement might be prosecuted, whether continued to its full accomplishment or stopped at any intermediate stage, no part of the work, if judiciously conducted, would be thrown away or prove useless, but all that might be performed would, in some respect or other, be beneficial.

The only objection is the expense, which would be at least three times as great as the cost of a similar channel at the place already mentioned.

The advantages to be derived from an eight and a half or nine feet channel through any part of the dam would be very important. Many of the smaller dhonies would be able to pass through at once without any detention, and the inconveniences and delays now experienced by the larger vessels would be greatly reduced. They would have to unship a comparatively small portion of their cargo, and when sufficiently lightened, would be able to pass through in almost any weather, and reach a perfectly safe anchorage, instead of being detained in a very exposed and dangerous situation.

What effect the improvement of the present channel to the

extent here contemplated, or the opening of a new one, might have on the sand-bank to the south of the dam, it is impossible to foretel; but that a considerable change would be produced appears to me very probable; and if the increased stream and currents were taken advantage of, and judiciously directed, it is not unlikely that the passage across the bank might be considerably deepened. But this forms no necessary part of the plan now under consideration, though, in the event of its being adopted, this branch of the subject ought to be carefully attended to; for without a very material change in the sand-bank, the navigation of the straits, if the channel is made through any part of the dam, must remain very imperfect, and be confined chiefly, as it now is, to country vessels.

3. The third plan is to open a channel twelve or fourteen feet deep, either through the Paumbum Dam, or, if it should be thought more advisable, through the promontory on the Ramnad coast. To form a channel of that depth through the dam would be a very expensive and exceedingly laborious undertaking. The length of the cut would be upwards of twelve hundred yards, with an average depth of four feet to be excavated. The labour of blasting and weighing rock, when the depth of water exceeds eight feet, is very great indeed, and almost impracticable, except in very smooth water. At the distance of eight hundred yards from the dam, the swell, during a great part of the year, is very considerable, and would add much to the expense and labour of the work; for it could only proceed there during very moderate weather, and would be liable to constant and tedious interruptions.

Of the whole extent, perhaps not more than half would be found to consist of rock requiring to be blasted, and the remainder of fragments of various sizes mixed with gravel or sand, a considerable portion of which, it might be expected, would be swept away by the currents, on the removal of the rocky ledges or beds which now protect them. Still the labour would be very great and extremely tedious, and the undertaking would require several years, probably not less than five or six, for its accomplishment. But even if the channel were completed to the proposed extent, I think it very doubtful whether the northern part of it would not be liable to fill up again. For on the north side, at the distance of eight or nine hundred yards from the dam, the current is not, I think, sufficiently strong to keep such a channel clear, and the influence of the stream through the enlarged opening of the dam would scarcely extend to so great a distance.

The plan would also be incomplete without the removal of part of the sand bank to the south of the dam, or a considerable improvement at least in the passage across it. This, it has already been stated, is uncertain under any circumstances, though I think

the increased quantity of water and force of the stream which so extensive an enlargement in the opening through the rocks would produce, would contribute very materially to any measures that might be undertaken with that view.

Though at first sight the bank appears to resemble very much the bars which are formed opposite to the channels through Adam's Bridge, still I think it is essentially different from them. As far as can be judged, it is permanent, and not liable to shift; and the principal causes which formed it, have, it seems probable for the reasons assigned in a preceding part of the Report, long ago ceased to exist, or at least now act in a very inferior degree. The bars opposite to the channels through Adam's Bridge are most extensive on the south side, and are thrown up by the very high surf and heavy swell produced by the south-west monsoon, which acts with great force on the south side of the bank. But at Paumbum, the space immediately to the south of the dam, where the bank is situated, is protected from the violence of the south-west monsoon by the range of islands to the south of it, which form a complete barrier, and comparatively little swell or surf is ever experienced there. Any alteration produced in the bank would, in consequence, be the more likely to prove permanent; and I think that the current and stream might be so directed, by means of stone bulwarks or jetties, as to produce a very great improvement.

But this plan, on the whole, appears to me much too laborious and expensive, and at the same time attended in several respects with too much uncertainty, to be advisable; and if a twelve or fourteen feet channel be considered absolutely necessary, I would recommend, in preference, that it be opened through the promontory of the main land.

In 1814 there was a very severe storm or hurricane at Ramisseram, during which the sea broke over the land in many places, and at about two miles from Point Ramen cut a channel completely across it. A ledge of rock on the south side of the land was destroyed and swept away, and a pit excavated seven or eight feet below the level of the sea for a distance of two hundred yards, from the end of which to the north shore the bed of the channel is three or four feet above the level of the sea. The gale from the northward lasted only about four hours;—had it continued a few hours longer from that direction, it is probable that there would have been a deep channel formed entirely through the land, though, most likely, it would not have continued open for any length of time, for the surf which breaks on both shores, but particularly on the south side, with considerable force, not being counteracted by a sufficient rise and fall in the tide, would probably, in a short time, have filled its ends with sand.

The breadth of the land here is seven hundred and twenty-eight yards. It consists chiefly of loose sand, with a little soft decayed rock mixed with it in some parts, which is easily broken with the hammer and pickaxe. On the north side there is a reef of coral, not solid or connected, but in detached masses, and of no great breadth, for at four hundred yards from the shore the water is fourteen feet deep. On the south side the water deepens very rapidly, the depth at one hundred yards from the shore being two and a half fathoms. A channel twelve or fourteen feet deep might, therefore, be cut here with comparatively little difficulty, and at a moderate expense; and being to the south, and entirely clear of the bank beneath the Paumbum dam, the removal of that bank, or a passage across it, would form no part of the undertaking. It is probable, however, that the channel would not remain open without some contrivance at its ends to prevent the surf from filling them up with sand; and this would, it is to be apprehended, be the most expensive and uncertain part of the project.

The easiest and most likely way to effect the object would, I think, be to carry a double bulwark of large stones from both shores, in a continuation nearly with the sides of the channel, into deep water, beyond the influence of the surf. The ends of the channel thus terminating in deep water, it does not appear that any cause would exist there to fill them with sand, for they would be beyond the reach of the surf, and there are no currents likely to produce that effect. It is probable that very little sand would enter the channel, and that whatever did enter would be swept away by the current through it, which, at all seasons of the year, would be considerable. The principal danger to be apprehended is the formation of a sand-bank to the south of the channel, or bars opposite to its ends, as occur before the natural openings in Adam's Bridge. This apprehension is perhaps not entirely without grounds, but if, on the completion of the channel, any symptoms of either a bank or bar should appear, I think the formation might be entirely prevented by constructing a second bulwark of stones in front and perpendicular to the ends of the first bulwark, at one hundred or two hundred feet from them. This narrow opening between the two bulwarks would be swept by the south-west monsoon and currents produced by it, which would most likely keep it always deep and free from sand. On the north side there is much less danger of any banks forming, for there are none opposite to the Paumbum channels, and the sea beyond the rocky ground is clear and free from obstructions of every kind.

After fully weighing all the advantages and risks attending the opening of a channel twelve or fourteen feet deep at this place, I think there are good grounds for considering the undertaking to

be practicable; but in deciding on the expediency of adopting or rejecting it, it is necessary to take into consideration the possibility of a partial or complete failure, for the project is so entirely new, and so unlike any thing that has hitherto been undertaken in India, that no comparison can be made with the result of other works of the same kind, and no information, therefore, drawn from experience; while, at the same time, the nature of the currents, their strength and direction at different seasons of the year, and the manner in which they are affected by the opposite monsoons, are all, in a great degree, still to be learnt.

Respecting the expense of the different projects, from what has already been said it will be evident that much uncertainty must necessarily exist, and that it is impossible to form any thing like even an approximation to a correct estimate. The expense will depend greatly on the seasons being favourable or otherwise; on the exact quality and nature of the ground beneath the surface at the place where the channel may be opened; on the currents, and the effect they may have in accelerating the operation by sweeping away the sand and loose soil when the solid rock is removed, or retarding it by producing, in some cases, a contrary effect; and on a thousand other circumstances which it is impossible to foresee, and which can only be discovered as the work advances. In the present state of our information, a general plan or course of proceeding only can be laid down, which will be liable to constant changes and modifications; and whichever of the projects that have been suggested may be preferred, it will be necessary to leave a great deal to the discretion and judgment of the officer who may be entrusted with its execution, not only as to the manner of proceeding with the work, but also the means to be used, the expense to be incurred, and the extent to which the undertaking may be carried with advantage. The following sums must, therefore, be considered as very rough guesses only, which may exceed or fall short of the actual cost to a very considerable extent:—

The plan of opening a channel eight or nine feet deep and fifty feet wide through the dam, at about thirteen hundred feet from its west end, may be calculated at 70,000 rupees (7000*l.* sterling), and two seasons would probably be required for its completion.

Deepening the present channel to the same extent cannot be estimated at less than 150,000 rupees (15,000*l.* sterling), and probably three years would be required to complete it.

The practicability of opening a channel twelve or fourteen feet through the dam, and of keeping it open, appears to me so uncertain, with our present knowledge, that it cannot with propriety be recommended, and it is unnecessary, therefore, to consider its expense.

Cutting a channel through the main land, where the sea made

a breach in 1814, would cost probably from one and a half to three or four lacs of rupees (15,000*l.* to 40,000*l.* sterling), according to the nature and extent of the works that might be required at its ends to prevent them from filling up with sand; and an equal uncertainty of course exists with respect to the time required for the performance of that project.

From a review of the several plans that have been proposed, it will appear, I think, that if a channel of eight or nine feet through the rocks be required, without reference to the removal of the sand-bank to the south, or the improvement of the passage across it, the most advisable place for such a channel is at about thirteen hundred feet from the west end of the dam.

If it should be considered expedient to confine the operations in the first instance to an eight or nine feet channel, but to keep in view the chance of extending the depth afterwards to ten or twelve feet, if circumstances and experience should justify the measure, it is probable that deepening the present channel would be the most desirable and safe way of prosecuting the undertaking. Though much more expensive, it is the more certain, and the channel would be in the most convenient situation.

The removal of the rocks which obstructed this channel have altered it considerably since it was inspected in last March, and in some places the layer or crust of rock which covered its bottom has been entirely removed. It is extremely desirable that the effect of one north-east monsoon should be seen on the channel in its altered state before any final conclusion is come to respecting its comparative merits and defects with those of the proposed new channel near the west end of the dam. If there is only a covering or crust of rock, as there seems every reason to believe, the rapid current through the channel during the north-east monsoon may, as that is now removed in several places, produce considerable alterations, not only on the channel itself, but on the ground to the north and south of it; and this it is highly desirable to ascertain before the expediency of improving or abandoning the channel is decided.

If a channel of twelve or fourteen feet is considered an object of sufficient importance to warrant the attempt, under the uncertainty which now exists with respect both to success and expense, and the imperfect state of our knowledge on the subject, I think the plan of opening a channel across the main land, where the sea broke over in 1814, ought to be adopted.

The best seasons for working, whatever plan is preferred, as far as can be judged from the experience of the present year, are from the beginning of March to the middle of May, and from the end of August to the commencement of the north-east monsoon. There are occasional intervals of fine weather in the months of

February and August, which might also be taken advantage of; but more than four or five months in the year cannot be calculated on for carrying on the work with advantage. The sea appears to be smoothest, and least affected by currents, from the beginning of September to the middle of October, and during that period the improvements to the north of the dam, or promontory ought to be executed; for, in the north-east monsoon, the water there is generally too rough to admit of the work being prosecuted with much success. In the months of March, April, and May, the rocks to the south of the main dam might be removed.

The process of boring and blasting rock under water was readily learnt by the small party of pioneers employed on the survey, and after a little practice was conducted with much success. In blasting the rock previously to removal, jumpers, six inches in diameter*, were generally used and found most efficient. They were worked by three men at a time, on a low raft formed of two large canoes, lashed together, and covered with loose planks. After a great number of experiments with different quantities of gunpowder, charges of from four to six pounds were thought to produce most effect, and were usually employed. The rock was bored quite through, the object being to separate and displace the fragments completely, and the charge was covered with gravel and small pieces of rock and coral. The gunpowder was fired in the usual manner by means of tin tubes. The large fragments were weighed by means of a common country boat, furnished with a windlass, derrick, and tackle. Slings, made of strong rope, were placed round the fragments by divers; to these the tackle was made fast, and in this way pieces of rock, three tons in weight, were occasionally raised into the boat. The apparatus was very imperfect, the flat boat and the small supply of timber sent from Madras, for this part of the operations, having been lost on the way down to Ramisseram; and the only substitutes procurable on the spot being a clumsy country boat and some drift timber. The small pieces of rock were brought up with the hand by divers.

The most convenient and expeditious apparatus for weighing and removing the fragments of rock in fixture, would perhaps be a large flat boat, partly decked, furnished with a double set of derricks, windlasses, and tackles, so arranged as to be used at the same time on opposite sides or ends of the boat. To save the necessity of raising the fragments into the boat, which was found very difficult, and attended with much delay, there ought to be three or four double canoes with decks, to receive the rock, and convey it to the places where it is to be deposited. There would then be no necessity for changing the situation of the weighing-

* Sic in MS.

boat when once placed, till all the broken rock within its reach was removed, which is a point of much importance, for it was found a very troublesome and dilatory operation to fix the boat in the right spot when there was much current.

The canoes of the boring rafts ought to be decked, to prevent them from filling with water and sinking, which they are very apt to do when there is any considerable swell.

A diving-bell, which might be made at Madras, would be of great use for examining the bottom, and fixing the most convenient places for blasting. The divers, it was soon found, could not be safely trusted with this; they usually directed the jumper to the first rock they happened to meet with, and frequently caused the same rock to be bored several times, which occasioned the loss of much time and labour, and left the rock imperfectly broken, and in a very unfit state for further blasting. Much depends on the selection of the points for boring and blasting, and a diving-bell would enable the officer in charge of the work to regulate this part of the operation himself.

When the water was tolerably smooth, and the current not strong, very little difficulty was experienced in blasting and weighing rock at the depth even of eight feet, but when there was any considerable swell, or a rapid current, it was impossible to proceed with the work: hence the great advantage, in respect both to time and expense, in selecting such a situation for the channel as will afford smooth water for the longest periods.

In conclusion, I beg to observe, that it would afford me much satisfaction if Government, previously to adopting any of the preceding plans, or coming to any final resolution on the subject, would be pleased to forward to the Honourable the Court of Directors, for the purpose of being submitted to experienced civil engineers in England, copies of the charts of the straits, and of all the information which has been collected during the late survey. The improvement of the navigation through the Manar Straits is an object of so great value and importance to Indian commerce, and so much depends on the choice of place and on the means to be used, that every precaution ought to be taken to obtain the best possible advice on the subject; and a delay of a year or two is of little consequence, when compared with the advantages which might possibly be derived from the opinions and advice of engineers in Europe who have been employed on similar undertakings.

If this suggestion should meet with the approval of the Right Honourable the Governor in Council, I would further beg to propose, that the papers should be entrusted to the care of Captain A. T. Cotton, who, it is likely, will be obliged to proceed to England in January for the benefit of his health, and who, having

THE MASSAROONY RIVER,

SOUTH AMERICA.

BY W. HILHOUSE ESQ

1830.

Arthur's Table

Northern extremity of the Merumeh Mountains.

Merumeh Mountains from Merenue Creek

Merumeh Mountains from the East

Peak in Kumaruman

Cliffs at Marybyacren

Note. This Sketch differs widely from other authorities but is an exact reduction of Mr Hilhouse's Map

MOUNTAINS OF ST GEORGE

Geographical Miles

Raleigh's Peak supposed Quartz

Cliffs of Ratchum

Perpendicular Quartz

Horizontal Granitic Slate (Fall of Comaron)

Perpendicular Granite (Marybyacren)

Amygdaloid (bottom of Macreba)

Sand

Falls of the Massaroony

Confused Granitic Stratum

Granitic Base

Sea

Alluvium

Geological Profile of B. Guiana.

Published for the Journal of the Royal Geographical Society by John Murray Albemarle St London 183_

C Bradbury

been employed at Paumbum during the whole of the survey, and having had the immediate charge and direction of the experiments, will be able to afford information on many points which cannot be sufficiently explained by either charts or reports.

Pending the reference to England, I would recommend that the observations on the passage should be continued, and that the present party of pioneers, increased to fifty men, with some ship lascars and divers, should be employed under the direction of an engineer officer in the improvement of the present opening, and in making some experiments on the bank to the south of it. Whatever the final decision may be respecting the more extensive improvements, the labour of such a party cannot fail to be very beneficial, while the expense would be inconsiderable, and much valuable information would be obtained, which would be highly useful in the event of the prosecution of the work afterwards on an extended scale.

It is due to Captain A. T. Cotton and Lieutenant F. Cotton, to mention the valuable assistance offered by them in the performance of the duty at Paumbum, &c.

(Signed) —— Sim,

Inspector-General of Civil Estimates.

II.—*Journal of a Voyage up the Massaroony in* 1831. By William Hilhouse, Esq., of Demerara, Corresp. Memb. R.G.S., London. Communicated by the Author. Read 23d December, 1833.

In 1801, an expedition was sent from Demerara up the Essequibo, to communicate with the Portuguese, through their post on the Rio Branco; and to endeavour, if possible, to stop the Indian slave-trade, which had been heretofore carried on by the Caribisce in that vicinity, whence both Demerara and the Rio Branco had before received their supply of Indian slaves. Dr. Hancock, since well known in the scientific world, was the most ostensible individual employed on that mission; and it is much to be regretted that he has furnished us with no public account of his observations on his interesting journey. His route, it is true, had been several times traversed before, as it has been since; but it was desirable, if possible, to get a few points of latitude and longitude to determine, at any rate, the course of the Essequibo. And the rough map which he compiled of his progress, only gives comparative distances, and lays down the points of entrance of the great tributaries; from which it appears, that, after the junction of the Rippanoony, the Esse-

quibo takes a south-east direction, and is supposed to rise in the mountains, about the longitude of the Comantine river.

We have heard also of expeditions from Cayenne and Surinam, which have penetrated considerably to the south-west of those colonies; and, according to report, one at least has reached the Amazon in that direction, by some of its northern tributaries. But we are still without any information as to the source of the Essequibo, and its subsequent course to its junction with the Rippanoony; we only know that the central chain of mountains is very low at the intersection of the Rippanoony, and afterwards rises to a considerable elevation; the river being obstructed by numerous falls of great magnitude. Here is a virgin tract, therefore, for the discoveries of future travellers, the more interesting as connecting the subject of the following pages with the French researches; and the accomplishment of which will erase a *terra incognita* from the maps of geographers, and unravel the mysteries of the unknown interior of Demerara.

The Cuyuny river has also long been ascertained to have a direction nearly parallel with the Oronoque, or W. by N., till it has passed the district of the Missions; but after that, its course is enigmatical. On consulting the maps and observations of Humboldt, I was immediately convinced that the Massaroony must be the natural drain of the intermediate space between the Cuyuny and the Essequibo; and by giving it a south-west direction, it would intersect that undiscovered region the El Dorado, or Great Golden Lake of geographical fable. From repeated inquiries amongst the Accaway Indians, whom I knew to be constantly traversing the space between the coast and the Amazon, I was convinced that no lake existed in all that space: but all reports agreed in describing the inhabitants of that region as the most savage and uncourteous, and that they refused to allow any traveller to enter their territories. This was the received opinion of all the old settlers whom I consulted on the subject; and I gave up the idea of penetrating in that direction for some time.

During the progress of my researches after the native cottons, however, I fell in with many stragglers of different nations, and amongst others the Attaraya, the very people who were reported to be so inimical to strangers. By interpreters, I ascertained from them, that they mingled indiscriminately with the other tribes of the Accaways, by whom they were described to be half Accaway and half Caribisce; and that the Caribisce nation had quitted that quarter, and emigrated eastward, in consequence of which there was no longer any war amongst the Indians in this direction. I determined, therefore, immediately to take advantage of this peaceable interval, to explore the Massaroony: and the short dry season of 1830 saw me start on this expedition.

I shall not, however, dilate on the circumstances of this my first trip. The short dry season finished so abruptly, that I was obliged to return much sooner than I intended. But I made a map of the course of the river, as far as I went, sufficiently accurate to prevent any future misconceptions; and determined to renew my researches in the ensuing long dry season.

It was of great importance, in my second excursion, to procure one or more companions, who would lighten the cost and authenticate my narrative; and Thomas Teschmaker, Esq., a proprietor of Wakenaam, having thus kindly joined me, he bore the half of my expenses, and we started together.

It may be interesting to some to know the equipment necessary for a two months' excursion up one of the mountain-torrents of Guiana. Ours cost about 120*l.* sterling, in the following articles: a canoe, five feet broad and forty long, with washboards and a quarter-deck; ten dozen knives, one dozen cutlasses, six axes, ten pieces of salempore, ten pieces of calico; fish-hooks, of all sizes, about five pounds; beads, thirty pounds; needles and pins; razors and looking-glasses, two dozen of each; twenty pounds of gunpowder, ten bags of shot, and flints; scissors, one dozen; and four guns. Our crew consisted of an Accaway captain and twenty-two of his followers—nineteen in the canoe, and three in a small hunting craft: their wages for the trip were a piece of salempore, a cutlass, and four knives, each; with a gun and a piece of calico for the captain. We gave also a gun to our pilot.

The wages of the crew we left at the post;* our agreement being for the whole trip, and not by the day—to take us wherever we chose to go, and bring us back to the post. This plan should always be pursued, as there is then no temptation to ill behaviour or pillage. Forty gallons of rum, a keg of sugar, another of salt, a jar of butter, half a dozen hams, a bag of rice, a barrel of biscuit, one dozen casiripe, with pickles and other condiments, five dozen of wine, five dozen of porter, ten gallons of brandy, with one cwt. of salt fish, were our *munitions de bouche.*

We halted the first night, to increase our stock of bread, at Caria island, about three hours above the post. It is absolutely necessary to start with at least one cwt. of cassada bread, well dried, as it is a chance if any more can be procured for a week afterwards. At Caria island commences the distinguishing feature of the Massaroony—an innumerable string of islands, dividing the river into from five to ten different channels, without intermission, for fully a week's journey; in which space, the two banks of the

* Posts are established on the different rivers of Guiana, to watch strangers passing up or down, and for the protection of the Indians.

river are scarcely once visible together, and one but seldom. Caria was once a Dutch post; and several plantations were formerly on the adjacent banks of the river, but the only traces of them now left are a few cocoa trees on the east shore. Above Caria, on a small island, is a Caribisce settlement of one family, which is the only one of that nation now left on the Massaroony. Here begin the rapids, the fourth of which, Warimambo, is the most remarkable in this day's progress. The river is here three or four miles broad, and continues nearly the same breadth the whole length of the archipelago. At Warimambo, a large open space in the centre of the river has, in the rains, the appearance of a vast lake, and in the dry season, that of a rugged rocky plain. The manner we ascended this, and all the other rapids that were too strong to paddle up, is as follows. The rapids do not fall in one sheet over a level ledge, but force themselves through a number of fissures, large intermediate blocks of granite dividing the different shoots of the fall. At the base of these blocks there is an eddy, into which the canoe is forced, where she becomes stationary, having no current either way; the crew now spring upon the rock, and wade as far up as they can find footing; by means of a long and stout rope they then pull the canoe or coorial into one of the shoots of the fall, where there is water enough to float her, and by main strength haul her up the ascent; they then take her out of the current, and lay her stern against the top of the rock, from whose bottom they have just mounted, with her head right up the stream; and at a given signal, they spring into her, and, pulling with all their might, endeavour to cross diagonally the different currents till they get into another eddy. This is the time of the greatest danger in ascending. If they are not active in seizing their paddles, the head of the canoe is taken by the current, and she drifts broadside down the fall, where she must be infallibly upset. If she is not strong-handed, she cannot stem the currents above, and in crossing them goes down the fall stern foremost; for the stream runs, at most of the rapids, ten or twelve miles an hour, and but for the detached rocks which cause the eddies, there would be no way of passing them but by tracking along the shore. We were several times reduced to this necessity, which makes the passage very tedious.

In our first day's journey we ascended eight rapids; and went over to the west bank, bivouacking for the first time on a wooded rock, between the Arecara and Weypopekay falls.

Throughout the whole course of the Massaroony, palms of all kinds are scarce; it is difficult, therefore, to procure leaves enough to cover a hut, and we made a temporary tent of the square sail of our canoe, which we took up for the purpose: we did not find this, however, sufficiently proof to the heavy pelting

rain that now and then fell; I would therefore recommend oiled silk hammock-curtains, in addition. As to our Indians, provided they could keep their fire alight, they cared little for the rain; but if it was so heavy as to put out the fire, they called loudly for a dram to comfort them. Whilst ascending the rapids, it is proper to give them three, or perhaps four, drams a day, or they get chilled from being so much in the water; but woe to all hands if they get drunk! In the still water, a dram at starting, and one at coming in, is enough, and ought to be the allowance stipulated in the outset.

At seven the next morning we started again; halted at Aramatta, a small Accaway settlement on the west shore, to breakfast; and at night slept at Cupara, another settlement on the same shore. This day we only passed, three falls, there being a considerable space of still water, where the current was not more than two and a half knots, and we thus made good progress; our average way was from twenty to twenty-five miles per day.

The Indians always eat the moment they awake. In the morning at six, our coffee was made, and the pepper-pot, in large tin kettles, was warmed, the wives of our captain and pilot taking the cooking department. It must always be inculcated, whatever the secondary object of the journey may be, that the first is to secure an ample supply of food at every opportunity. Throughout this expedition we never refused to purchase cassada bread or barbacotted game and fish, though frequently overloaded with both. The Indians, provided they eat early, do not require a regular meal till evening; but they continue the whole of the day to drink, at intervals, draughts of *pyworee*, a gruel of cassada crumbled into cold water; and in this way such a quantity of bread is drunk, in addition to what is eaten, that you can hardly have too large a stock.

Our day's journey commenced at seven, and ended at three, four, or five, just as we happened to find a convenient resting-place. A large bold sand, with a clump of trees, was our favourite bivouac; here you have room for a walk, good bottom for bathing, and poles to hang hammocks: if these are found, I would always prefer bivouacking, in fine weather, to sleeping in the houses of the Indians, where you are generally poisoned with smoke and bitten by fleas and chigoes.

Our third day's journey brought us to the fall of Tepayco; the route being, from Cupara, still water, except one trifling rapid. This being an excellent fishing and hunting station, we halted for half the next day. At night, we took a very fine lowlow, and the next morning a number of peri, a pacou, and several feathered game, mamoes, pigeons, and maroodies. Tepayco is the first

fall of the second great ledge of granite; and our third day brought us over this to Sapeera, the foot of the third or Caboony ledge, where we slept.

We here fell in with a party of Accaway Indians, who were going down to receive presents. They had been upset in the Sapeery fall, and had lost everything but their hammocks. They seemed to make very light of their accident when we assured them that they had time enough to return, and get a fresh supply of bread before the presents were given out.

We bought of these Indians several bundles of hai-arry: this is a papilionaceous vine, bearing a small bluish cluster of blossoms, producing a pod about two inches long, and less than a goose-quill, with small grey beans, about ten in number. Its leaf is about nine inches long, being a central stem, with four spear-pointed leaflets on each side, two inches long, and one at the apex. The root, which is of slow growth, is, when full grown, three inches in diameter; it contains a white gummy milk, which when expressed is a most powerful narcotic, and is commonly used by the Indians in poisoning the water to take the fish. They beat it with heavy sticks till it is in shreds like coarse hemp; they then fill a coorial with water, and immerse the hai-arry in it; the water becomes immediately of a milky whiteness, and when fully saturated, they take the coorial to the spot they have selected, and throwing over the infusion, in about twenty minutes every fish within its influence rises to the surface, and is either taken by the hand or shot with arrows. A solid cubic foot of the root will poison an acre of water, even in the falls, where the current is so strong. The fish are not deteriorated in quality, nor do they taint more rapidly when thus killed, than by being netted or otherwise taken. The pacou is generally taken with hai-arry, in the following manner: the Indians select a part of the falls, where the weya* is plentiful, and traces are visible of the pacou, which is gregarious, having lately fed. They then inclose this place with a wall of loose stones, a foot above the surface of the water, leaving two or three spaces, about ten feet broad, for the fish to enter; for these spaces they prepare parrys or wooden hurdles, and about two hours before daybreak they proceed silently to stop the apertures with them The fish are thus inclosed in a temporary pond, which is inspected at daybreak, and if they are found to be in sufficient number to pay for the hai-arry, they commence beating it. I have in this way taken, in less than an hour, two hundred and seventy pacou, averaging seven pounds weight, with one hundred weight of other fish. The fish thus taken is split,

* An aquatic vegetable, eaten by the pacou and other fish.

salted, and dried on the rocks; and is sold at one guilder a fish, when cured. Travellers should never be without a few bundles of this root when mounting the falls.

The next day we reached the Caboony creek, and bivouacked on a small rocky island at its mouth. The Sapeery fall is a difficult one, but not to be compared with that of Caboony, which is full thirty feet high, in four different ledges. It cost us an hour's hard labour to get over a space of one hundred yards. On entering the Caboony creek, where we intended to recruit our stock of bread, we found a specimen of the migratory habits of the Accaways; there were at least, in the preceding March, two hundred Indians, with a good stock of provisions, here; now, the place was completely deserted, and we could get no bread but by going a day's journey up the creek.

At this place we were obliged to unload the canoe, and haul her up light over the Piramappuh fall, as she would otherwise have filled from the steepness of the shoot; we then, after a hearty meal, left our baggage on the rock, and pulled up the creek, bread hunting—to little purpose; for, in about half an hour, a huge tapir or maypuri swam across the creek, right ahead of us, at which we fired, and, supposing him wounded, all hands landed in pursuit. In was two hours before our people returned, without success, and the day being now too far spent to proceed, we returned to the rock, and dined on an immense pacou, shot during our absence.

We had now nothing to do but to pull for the Massaweeny creek, which we reached with no particular occurrence on the third day, passing the Punoony creek. The river, from the Caboony to this point, turns considerably to the westward. The Punoony has a small fall directly at its mouth; about one hundred Indians reside at it; and there is a path of communication between it and Cuyuny, three days and a half journey.

As far as Massaweeny creek had been explored by Mr. M'Kay, a year ago, in search of Sirwabally timber; but at this point commenced the *terra incognita*, and we laid in a stock of bread for a week, by staying here two days. It is a small settlement, but well supplied with cassada and buck yams. I contrived here to make a new acquaintance, in the shape of a small worm, called teckih, half an inch long, and the thickness of a pin, with a large head; which bored through the skin in several places, and caused the most painful itching. As soon as I discovered the cause, I applied a little calomel on the aperture, and covering it with a plaster, extracted the worm.

The day we left Massaweeny brought us to Araquaw, a pretty deserted settlement on a conical hill on an island; here the fleas set us at defiance, and we hung amongst the trees at the water's

edge. The next night our quarters were not better, in a low island, at the thirty-third fall. These two days, the river again ran southerly. On the third day we got clear of the archipelago; and towards evening, in rounding the point of the river opposite Ocoowa creek, we got sight of *Arthur's Table,* the first visible point of the mountains of St. George, the great central chain of Guiana. We slept this night a little above the Muribisce creek.

It is hardly possible to describe the relief to the feelings we experienced on emerging from the everlasting confusion of islands and narrow passages into, once more, the open and placid Massaroony, which from this point again took a westerly turn, with scarcely a single curve in its course. It had the appearance of an immense inland lake ; and Arthur's Table, at an apparent distance of about sixty miles, was a treat to a Demerarian, who had seen nothing for years but the dead levels of the coast. We did not get access to this mountain, but, by comparison with the part of the chain we afterwards scaled, it must be five or six thousand feet above the level of the sea. We found no perceptible difference of temperature between this point and the coast; but, upon boiling water, the point of ebullition was barely 210° of Fahrenheit.

On leaving this point, we breakfasted at a small settlement called Keaquay, where the river again turns to the south; and proceeding, took up our quarter on a sand-bank in an island at the mouth of the Semang creek. Having, at Keaquay, procured a supply of bread, we staid here two days, to fish and hunt, filling our pepper-pot with excellent fish, and some feathered game. We, the third day, mounted Teboco, the thirty-fourth and last fall; being the extreme southern point of our whole excursion*. From our last camp we had, at intervals, a glimpse of a table-mountain, due south, with a conical peak, at the north extremity, extremely like the crater of a volcano; it was equal in height to Arthur's Table, and we christened it Raleigh's Peak. The Car[illegible]ng creek appeared to lead in a direction toward it; but as none of our party could guide us to it, we proceeded to the settlement of Aramayka, the river, from Teboco, taking a course back again, nearly N. by W. At the fall of Teboco, the river narrows to one-third of its usual breadth, but widens again immediately after. At Aramayka, the cliffs of Marybyacrew

* One can hardly suppose that the tradition of a great inland lake could have been spread over so wide a tract, entirely without foundation, and I venture to offer an explanation of the fabled lake Parēmah, as follows. The Massaroony, for ten days' journey above Teboco, is still water, with little more current than some lakes. If, at any former period, the horizontal stratum of granite at the pass of Teboco was unbroken, the still water must have been at least fifty feet above its present level, and a vast lake, ten or twelve miles wide, by one hundred and fifty or two hundred miles long, would be the natural consequence. Presume on a fact like this, and El Dorado need be no fable.

become visible; about one thousand feet high, with perpendicular northern faces. A remarkable detached peaked rock, on the west face of the cliffs, is called the Caribisce. The legend says, it is a man of that nation turned into stone for attempting to scale the cliffs. We hooked at Aramayka a noble lowlow, of nearly two hundred pounds weight. This fish is very common through the whole of the still water; which proves a great depth, as its haunts are seldom less than four or five fathoms deep. The river is here a mile wide; being about two hundred and fifty miles from its confluence.

I expected, that in this region I should have been able to determine the natural history of the pacou, but, strange to say, from Teboco upwards, we did not see or hear of a single fish: it appears entirely confined to the falls of the archipelago; and the fry of it is as yet entirely unknown to either the Indians or the Europeans*. I have caught, by poisoning the waters, upwards of one thousand pacou, and the fry of other kinds of fish, to a finger's length; but in all this wholesale destruction, I have never seen a pacou less than a foot long.

At the point of Teboco, the granite assumes a regular formation for the first time, and is ever afterwards found in strata, at an angle of about five degrees above the horizon; its apex being nearly northward. It forms the base of all the cliffs to a height from about six hundred to one thousand feet, when a perpendicular and cubical formation of quartz is the general superstructure to about fifteen hundred feet higher.

From a little above Aramayka, the chain of Merumeh is seen, bounding the horizon, and stretching to the north, where it appears highest, and terminates abruptly in perpendicular faces, like the other branches of the chain. Near the southern extremity, in a clear day, a white curved line is seen, extending from the summit to the base of the chain; which is the Merumeh creek, forcing its way from the table-land above to the valley of the Massaroony below. From this point it is fully fifty miles distant; and as it cannot be less than twelve hundred feet high, in my first trip I had some difficulty in believing the Indians' assurances, that it was truly a cataract, though a powerful glass gave it evidently the appearance of water. At this present time, the mountains were so clouded, that we could get but a very faint and uncertain

* Upon a reference to my memorandums, I find that we here saw, swimming upon the surface of the water, small fry, of about an inch long, in numerous shoals. The Indians either could not or would not tell us what they were; though it was evident that they were of the same family as the pacou. Should it be that fish, the inference is immediate—it breeds in the still water, which it does not quit till of a sufficient age and strength to shoot the falls. It must then change its food as well as domicilium, for there is no weya in the still waters.

view of it, though our after experience gave us full reason to believe in the probability of its existence. We were disappointed again in procuring a guide up the creek; the few inhabitants who were there on my last excursion having since deserted it. It is one of the greatest inconveniences of travelling in the Accaway country, that a populous village one year is totally deserted the next, and the inhabitants a thousand miles off. To compensate for this, however, houses spring up as suddenly in the uninhabited solitudes; so that your guide, if he has recently been the route—(his greatest qualification)—can generally find provision stations.

At half a day's journey from Aramayka is Abadukaye, where it is absolutely necessary to lay in bread for four days, as there is no intermediate settlement between this and the Ehping creek. In the course of the next three days' journey, the views of the adjacent cliffs and mountains were beautiful; but the sleeping-places indifferent, with the exception of the third, a sand opposite the Corowa-aikura creek, which is pleasant enough. A day's journey farther is Ehping creek, where it was necessary to lay in a week's bread. The river here is not more than four or five hundred yards broad, and is full of sand, but with very few rocks. The hefa or musk-duck is frequently seen; and the population of the Indians increases considerably.

On the 10th of October, having been twenty-six days' journey from the post, we arrived at the mouth of the Corobung creek, where we bivouacked; and were soon well supplied with fish and game. We, the next morning, started up the creek, which is about one hundred yards of average breadth: and having met with some detention from a flock of wild hogs, of which we took four, we reached the settlement of Pero, on the west bank, that evening. A day and a half from this brought us to the fall of Macrebāh, where navigation ceases.

In describing the scenery of this creek, I feel as much at a loss with my pen as my pencil. The features are so totally dissimilar to those which are generally described as beautiful and romantic, that I can only state, whatever was the cause, my chief sensation was an oppression of the senses, from which I was glad to escape. In the first place, the water of the creek, though perfectly transparent, is a deep chocolate colour; and the sands are reflected in it, of a bright claret or purple. The creek winds about in the most opposite directions; and at every turn, a large and bold spit of white sand projects, which contrasts most unpleasantly with the surrounding water. There is uniformly no middle ground for the landscape; but from the dark and still creek, with its uniform fringe of trees, starts up, as if by magic, a perpendicular cliff, of one thousand or fifteen hundred feet; which you knew is distant, but which you feel as if in your most

dangerous proximity; and, as you see all around you detached masses, apparently torn from these gigantic walls of nature, you expect every moment to see one of them blocking up the creek before you or cutting off your retreat. Every two or three hours you come to an immense block of granite, to pass which you have a channel barely wide enough for your craft; then the channel widens to one hundred and fifty yards, and you are in a claret-coloured lake, so shallow that you can scarce swim. At the very last, you enter a capacious basin, as black as ink, surrounded by a bold extensive sand, as white as chalk; and you hear a fall of water before you, but perceive no current, though there is a foam like yeast on the surface, which remains the whole day without any visible alteration. On a more attentive examination, you perceive at a distance a broken white line struggling through a cluster of granite rocks, at the base of two quartz cliffs, of a mixed character; and this is the fall of Macrebāh. In the basin below we saw frequently an appearance exactly similar to a snow storm: whenever a gust of wind came down the fall, it raised before it the froth or foam in flakes so exactly resembling snow, that a slight observer might have been easily deceived by it. We here saw several specimens of the cock of the rock, called by the Indians Cowanaaru, both skinned and alive, and ascertained, beyond doubt, its natural history, being entirely fructivorous.

We pitched our tents on the sand, at the east side of the basin; and as the fall before us did not appear to be more than four or five feet in height, we were rather disappointed in the Indian account of the falls of Corobung. In the morning we proceeded to measure the fall, by the simple experiment of placing Indians on the different ledges, with the feet of one on a level with the head of another. In this way we were nearly half an hour in scrambling to the top, and twenty Indians, or about one hundred feet, was the real height of what from below appeared so trifling. But even here, at the very top of the fall, the stream ran principally in subterranean passages—the bottom of the masses of granite being worn so much away, that the tops projected and hid the watercourse from view.

Water boiled here at 208° of Fahrenheit; and we could perceive that, in coming up the creek, a wind from the cliffs was nearly ten degrees cooler than one from the river. In the middle of the fall of Macrebāh, I also found a small spring of clear transparent and slightly effervescent water, without the least ferruginous tincture. This spring appeared to issue from the superior quartz formation, and proves that the extraordinary purple tinge of the waters of these creeks is from the decomposition of the granite, the iron of which, in combination with the solution of

astringent vegetable matter, gives the peculiar dark appearance of all these creeks*.

After a day spent in attempting to sketch Macrebāh, we proceeded up the Scroon creek, which is a little below Macrebāh, and having landed on the south bank, began to scramble up the hill for the upper fall. Of all the paths I ever saw, this was the worst, for the first hour's journey; the greater part of it was at an angle of 45°, with abrupt descents, and ladders of roots. My companion, after an hour's perseverance, was exhausted, and gave up. As I was considerably the lighter of the two, I however proceeded, and there being cool springs of water issuing from the rock at short intervals, I got to the top in about two hours; the last hour being comparatively easy. I here found the remains of an Indian shed, and could hear distinctly the fall; so I sent back to my companion, who joined me the next morning, before nine o'clock; and, having breakfasted, ten minutes' walk brought us to the fall of COOMAROW.

We were now on table-land, being evidently the extreme height of the granitic horizontal formation, the laminæ being per-

* In alluding to this spring, which is the only one I had then seen in the colony rising in an elevated rocky surface, and not merely a percolation through sand-hills from adjoining swamps, as is the case with the heads of alluvial creeks, I have been struck with a most remarkable coincidence, recently discovered. In the centre of George Town, Demerara, Major Staples, of the Custom-house, with an inefficient apparatus, but by constant perseverance for a number of years, succeeded in penetrating the depth of the alluvium; and on arriving at the micaceous substratum, which is the indication of the primary formation, a clear spring of water burst out, exactly of the same appearance and quality as the white spring of Macrebah. An examination of the progress of his boring process is an interesting geological morçeau on the formation of alluvium. It was well known, that at ten or twelve feet below the surface, an irregular stratum of fallen trees, of the kind called courida, common on the coast, existed in a semi-carbonized state; but Major Staples discovered, at *fifty* feet below the surface, another immense fallen forest of the same kind of wood, twelve feet thick; the superstratum being blue alluvium, and the substratum reddish ochre, diminishing in shades to yellow, light straw, and again merging into slate-coloured clay. The remainder, to a depth of one hundred and twenty feet from the surface, is argil, the lower part of which is of that smooth soapy surface which indicates the purest Wedgwood clay, and would no doubt be of great use in the potteries. It is evident from this, that some few ages ago this continent was habitable fifty feet below the present surface; that it was then covered with an immense forest of couridas, which was destroyed by conflagration, as appears by the ochrous substratum. The sea must, at that time, have been confined to the blue water, where there is now eight or nine fathoms; and whatever may have been the comparative levels then between the Pacific and Atlantic, the level of the water on this side of the isthmus of Darien is now fifty feet higher than it was once—whether before or after Columbus's time is uncertain. An endless train of deductions follows, but the practical one is this;—that in a land where we formerly depended on the clouds for water in the dry season, we can now, as in other countries, draw it also from the earth. No estate has now an excuse for being without a sufficiency of fresh water, at least for culinary purposes. In fact, Major Staples has done more for the colony, by this one successful experiment, than any individual before him.

fectly horizontal, and those of the bed of the creek in large plates or layers, of from one to three inches in thickness. The creek itself was one hundred yards broad, but was so completely choked, from as far as the eye could reach above to the edge of the fall, with grass, that there appeared scarcely any water in it. This grass was in appearance like large horse-tails—the roots being fixed to the bottom of the creek—the stem as thick as an arm, and dividing at top into a multiplicity of long threads, which completely covered the surface of the water. Through this green sieve, however, a good two feet of water percolated, and discharged itself in one uninterrupted sheet, one hundred yards broad, and at least double in perpendicular descent. By holding on the grass, we waded across the fall to the eastern side, where we had the best view of its distinguishing features, so totally differing from anything we had before seen. From the side of the fall, the shoot seemed to have an inclination out of the perpendicular inwards, and finished in a perpetual rainbow and mist, so as totally to obscure the bottom. At some distance below this, the creek appeared like a narrow white thread running between the rocks, which were of an Indian red colour. And such was the distance of the descent, we could not at the top distinguish the noise of the fall when striking the bottom; that at the top of the pitch was very trifling. By boiling water (206°), we were here two degrees of Fahrenheit above Macrebāh; and though the bottom of the fall was utterly inaccessible, the appearance of the creek from the top did not authorise us to deduct more than three or four hundred feet for its descent; and the evidence of our own eyes, from the side, giving the fall at least double the descent of the breadth, we had no hesitation in pronouncing it six hundred feet, which I am certain will be found within the mark.

From the bottom to the top of the fall, the temperature had decreased fifteen degrees (85° to 70°), and the climate was, consequently, delightful; but time was pressing, and as my companion, with every disposition to proceed, was evidently not equal to a rapid journey over these precipices, we relinquished our intended advance to the next fall of Asceaquaw, which was on a comparatively small scale and two days' journey distance, and returned to Macrebāh.

We saw Coomarow when the creek was at its lowest, but the grass and water mark on the boughs of the trees and on the banks were fully eight feet above the present level. In the rainy season, therefore, it must be absolutely inaccessible, as the whole of the table-land on which we stood must be then flooded. In this state the fall will be nearly one hundred and fifty yards broad, and the body of water discharged ten feet deep; and, according to the

Indians, such a smoke ascends from the bottom as obscures all the surrounding landscape. It can then be heard at Pero—a day's journey distant. But it is not likely that any traveller will see it in this state.

On leaving Coomarow we felt considerable mental relief; for altogether it was an object that rather oppressed and astonished, than pleased and gratified us; and we now turned our backs to the cliffs, and prepared to enjoy a scene much more adapted to our feeble conceptions.

At a bold turn, where the creek opened into a broad bay, we found the whole creek population of Indians, with forty or fifty craft, busy beating hai-arry; and we pulled into the middle of them just at the moment the fish began to feel its effects. It was the most enlivening sight—men, women, and children, with bows and arrows, knives, and landing nets, chasing in all directions the intoxicated fish, which nearly covered the surface of the water. I was soon left with one hand in the canoe, the rest taking the light mapepuhs of the Indians, and each pursuing his own share of the sport. Though my craft was rather unwieldy, I got, with a small landing net, one hundred and fifty-four fish, of about four or five pounds average; and there were at least thirty other craft loaded to the brim. As soon as the fishing was over, we pulled as fast as possible to Pero, and began barbacotting our fish before they spoiled. Upwards of two thousand, of four pounds average weight, were taken. For two days and nights, it was now nothing but fire and smoke, curing the fish, of which we laid in as much as we could possibly consume for a fortnight; and, this completed, we bade adieu to our Coorobung friends, and proceeded on our return to the Massaroony.

On our passage down the creek, we were absolutely annoyed with the quantities of bread and yams brought from the different settlements, for sale; but as our rule was never to refuse provisions, we took all; so that when we again reached the Massaroony, we were stored for a month. We now resolved to proceed up the river as far the season would allow us; and having spent ten days in the creek, left it on the morning of the 21st of October.

The last night at Pero, however, there was a heavy fall of rain. This night was still worse, and our encampment very uncomfortable. I began to suspect that the dry season was nearly over; and, upon questioning the Indians, they told us, that of course "it was so, or the people would not otherwise have beat the hai-arry." In fact, it appears, that, in the immediate vicinity of the mountains, they can calculate to a certainty, within a few days, the breaking up of the seasons; and as I had in March a pretty good sample of the thunders of Merumeh, I advised my companion to return.

I now found that the short dry season is not long enough to penetrate into the mountains; and that the long one should be taken early, i. e., the middle of August. From the Caranang creek there is a path, which communicates, in two days, with the source of the Massaroony; and a day farther, with the Quaw-ding —either the Rio Branco, or a branch of it. This is, therefore, the route for future explorers; who ought always to have a fortnight before them, to look at the Semang and Caranang creeks. Merumeh is a point of most particular moment, as the table-land in that direction must be of vast extent.

On inquiring amongst the Indians, whether the mountains were inhabited, the uniform answer was—"No; where would the people get water?" It appears, therefore, that except in the creeks that arise in them, and where the paths of communication across are found, there is no population. The natives, however, all agree, that formerly the whole of this region was peopled by the Caribisce; and the true Accaway country is not acknowledged to begin for three days' journey west of the Corobung. All the names are Caribisce, and the present inhabitants have, within twenty or thirty years, emigrated from the west and south, the Caribisce having gone off to the east.

That there has been here a powerful nation of Indians is evident, for the Caribisce were that nation; but that there ever was a great capital is impossible, for except the Indians became graziers, they could not subsist together in sufficient numbers to form more than a small village. There are savannahs at the western extremity of the detour of the Massaroony, which extend to the head of the Cuyuny, and are eligible for cattle grazing; but they are inhabited by the most migratory of all the tribes, the Paramunahs; and here, if anywhere, is the lake Parēmah, an elevated savannah, perhaps flooded in the heavy rains.

It is curious to observe, that the cause of the desolation of these regions has been the abolition of the Indian slave-trade. The Caribisce, deprived of their market on the coast, have retired to the interior, where they still find purchasers amongst the Brazilians; but to make an equal profit with them will require double the number of slaves to what were required for these colonies, for it is notorious, that in the Rio Branco, at all times, Indian slaves could be purchased at one-third of the price given by the Dutch. The suppression of this traffic here, therefore, without taking the requisite steps to put it effectually down everywhere, has desolated our interior, and driven from us our bravest and most faithful allies. And it has not diminished, but, on the contrary, greatly increased the lot of human misery, for more slaves are now sold

to the Portuguese than were to us, and they are worse treated, being mostly worked to death in the mines.

In our excursion I was anxious to find, not gold and emeralds, but spots where men, driven by circumstances from their native country, might find a shelter and a home; but I must confess that I did not succeed. There is no tract in El Dorado like the site of the Missions of the Caroni; and the mountains, though their temperature must be favourable to the shepherd, do not, from their structure, give much promise of fertility. The observation of the Indians is here also applicable, for except on the immediate borders of the mountain creeks, there is no water. In fact, this country is only inhabited by tribes of hunters, for the simple reason, that it is uninhabitable by others; add to which, it is, for the transmission of merchandise, inaccessible.

The fall of Teboco appears to be the key of El Dorado; below this the Indians are all more or less sophisticated, but at Coorobung there was not the least trace of civilization, except amongst the stragglers from the Missions, who were making haste to forget it. We found, however, an Accaway, of Coorobung, with all his superstition and stupidity, infinitely superior to an Arawaak of the coast, with his pretensions to cultivation; and it was not till we returned to the post, that we again entered the atmosphere of vice and crime, Indian misery, and depravity.

The descent of the falls is accomplished with a rapidity of which few travellers have a conception; in less than one day, we got over the ascent of three—eighty or ninety miles being an easy day's journey. The middle channels are now chosen, where the current is most rapid, and the greatest body of water is rushing through. It requires four stout hands, two ahead and two astern, to give steerage way whilst shooting many which are very crooked: that of Itachuh is a zigzag of four turns, and not a few accidents have occurred here to the small craft of the Indians; we, however, got through all danger, and, on the 30th of October, arrived at the post.



VIEW on the MASSAROONY.

Natives Fishing

[illegible] Albemarle Street, London 183[illegible]



III.—*Journey through the Himma-leh Mountains to the Sources of the River Jumna, and thence to the Confines of Chinese Tartary: performed in April—October, 1827, by Captain C. Johnson, late of the 11th Dragoons.* Analysed from his MS. Journal, and communicated, with remarks, by W. Ainsworth, Esq., F.R.G.S.; and Foreign Correspondent of the Geographical Society of Paris. Read 24th Feb. 1834.

Having formed a party with two of the officers of his regiment, Captain Johnson left Cawnpore on the evening of the 1st of April, 1827, and after a journey, in palanquins, of about three hundred and fifty miles, arrived at Hurdwar during the period of the great fair held there in the early part of April. Hurdwar (Heri, Vishnu, and Dewar, a passage) is at the foot of the first range of hills met with on approaching the great central chains; and here the union of the Bageruttee and the Alacnunda, called the Ganga or *the river*, forces its way through the mountains from the valley of Deyral into the plains. The spot where the waters first issue from the mountains is peculiarly sacred, and the assembling of persons from the most remote parts of India, to perform those ablutions which their religion enjoins, led ultimately to the institution of a fair, or mercantile meeting.

The pagodas, with the ghauts for bathing, occupy the right bank of the river, under the town, through which lies the only path into the Deyrah Dhoon, or valley. The mountains on each of the pass are of no great height, and rise on the one side with a perpendicular face of bare rock, and on the other with a gentle slope, wooded to the summit. The Fakeers, who make Hurdwar their abiding place, have generally caves hollowed out in the rock above the pass, and accessible only by means of ladders: some few reside in the temples. Captain Johnson considers Raper's estimate of the visitors at Hurdwar, one year with the other, at two millions of souls, as being rather below than above the true average.

Our traveller took the opportunity of a short stay at Hurdwar, to visit Kunkul, a neighbouring collection of sacred buildings of the Hindoos. There were pagodas and deotas of all sizes and shapes, some of the handsomest specimens of Hindoo architecture which he had seen, only much defaced by the uncouth figures of their mythology painted on the outside in glaring colours, and with an utter disregard of proportion and ignorance of perspective. The total want of observation of a native artist cannot be more strongly exemplified than in the representation of the "Tenth Avatar," where Vishnu, like our Death in the Revelation, is expected to appear mounted on a white horse; the horse is invariably represented at a trot, either with both the off or both the near feet

raised at the same time, which peculiarity of motion belongs to the camel but not to the horse.

The valley of Deyrah, which our traveller entered by the pass of Hurdwar, varies from twelve to fifteen miles in breadth, and may be about seventy miles in length, extending in a nearly east and west direction to the foot of the second range of hills. The entrance to the valley was peculiarly beautiful, with a most luxuriant and almost virgin vegetation; in the tree-jungle, the creepers attain a very great size, spreading from tree to tree, matting the whole together, and rendering it impenetrable even to an elephant. The Dhoon, from this reason, is unhealthy, except in the neighbourhood of Deyrah, where the jungle has been burned for several miles around. The valley is otherwise cool, and watered by numerous rivulets, abounding in fish resembling trout; and the jungle abounds in all kinds of *game* from the tiger to the quail. The character of the trees, and the scenery generally, resembled very much that of our own latitudes, and this illusion was only destroyed by occasional glimpses of the snowy range, and by the appearance of black partridges and jungle cocks. Greenswards, from the growth of graminæ, begin in these regions to occupy the surface soil, more particularly beneath the shade of the banyan-trees.

As they advanced up the valley they were obliged to cross the dry and stony beds of rivulets and rivers; the wooded undulating ground and open lawns had disappeared, and the country was flat, rather swampy, or covered with withered graminæ.

The distant snowy peaks of the Himma-leh, seen from these spots, had an extraordinary appearance, the acclivities of the mountains being concealed by the clouds, and the loftiest peaks starting in an almost irrecognizable manner from the blue sky above.

The tree jungle of the Deyrah Dhoon consists mostly of teak, leesoo, and some pines; in the vicinity of Deyrah were topes or groves of mangoes; in the court of the Seik Temple, jack-trees; and in the hills beyond Deyrah, cultivated land, abounding in corn.

The small town of Deyrah is about four miles from the second range of hills, and is formed by the cantonments of the Goorkha regiment, raised after the Nepaul war, and the native bazaar attached to it. Within a few miles of Deyrah is the Fort of Katuga, not in itself a place of strength, but in a nearly inaccessible situation, and during the Goorkha warfare, it was desperately defended by that tribe.

At Deyrah the party hired coolies, and started on the 21st, following the windings of a small mountain stream till they came to a low fall, above which the stream expanded into a small lake;

they then crossed over a wooded hill to the right, through thick brushwood, abounding in pheasants and other game-birds, and proceeded to the village of Nagul, situate on a steep bank over the river Saone; the valley of which forms the entrance into the second range of mountains. From hence the party followed the bed of the river, which is strewn with huge rocks for about a mile to the dripping rock of Sansadarrah, opposite to which there is a small shed for travellers.

The dripping rock of Sansadarrah rises to a considerable height over a small basin of water, which is only a few yards from the river. The rock overhangs this basin like the roof of an open piazza, extending for about fifty yards in length. Above it there is a small stream, which flows from the mountain side to the edge of the precipice, where, instead of forming a cascade, it is absorbed by the marshy nature of the soil, is filtered through the rock, and falls into the basin in a perpetual shower. The rock is covered with beautiful stalactites, which are more remarkable in a cave to the right (in facing the rock), where the roof is actually studded with them, and where stalagmitic incrustations abound on the floor, which, meeting the stalactites, look like pillars supporting an edifice. In the bottom of the cave the water is about two feet deep. A curious deception occurs when the sun does not shine on the sparkling drops,—they become quite invisible, and the water is so entirely lost sight of, that our traveller could not convince himself that it had not ceased falling till he crossed the stream to view it more closely.

Around Sansadarrah the hills rise almost perpendicularly on every side to the height of five thousand feet, and are clothed to the very top with the most beautiful wood. As there is always a breeze above, the rustling of the trees mingled with the sound of the falling waters and the murmuring of the Saone, assisted by the great heat, has a lulling effect, and gives a peculiar charm to this spot. Our traveller's remarks on the rustling of the leaves remind us of similar impressions experienced by De Humboldt in the forests of the upper Oronooko, where the absence of that sound gave even a greater intensity to the disagreeable sensations caused by heat.

At this point of their journey the travellers were obliged to abandon the outer fly or cover of the large tent, which could not be carried along these almost pathless tracts. In the vicinity of Sansadarrah there is a spring, impregnated with sulphuretted hydrogen, and depositing sulphur in a thick coat on the edge and bottom. The waters were clear and tasteless.

The road, on leaving Sansadarrah, wound for the first mile along the hill, at a great height above the river. As they were moving along one of the party shot a rocket-bird, the first they had

seen. After passing an open spot, where the Kaldee torrent, or Gadh, joins the Saone, the ravine contracts, and the road lies in the bed of the torrent, which is filled with large rocks, rendering the progress very difficult. They here met with a party who were twenty days' march from Gangoutree, three in deep snow. They carried one of their number in a basket, his leg having been shattered by a falling stone. In the continuation of their journey beyond Rhudwarah, the path ascended in a zigzag manner up the face of a nearly perpendicular precipice, till at the height of about three thousand feet above the ravine, the crest of the ridge is attained, and the road again descends into a deep and gloomy valley called Muggra.

This is the second range of hills traversed in approaching the Himma-leh; and from the crest on the one side was seen the rich valley of Deyrah, with the plains of Sehampore in the distance; and on the other, hills clothed with pines; and beyond, the gigantic peaks of the snowy range towering above everything.

This is the first appearance of pine-trees, which commence on the upper parts of the hills; lower down were abundance of vegetables, wild fruits, and shrubs. They noticed cherries, pears, raspberries, and strawberries. Nothing could exceed the number, beauty, and variety of flowering shrubs. Whole sides of hills were sometimes covered with yellow and white jessamine, gum cistus, and the scarlet rhododendron, which grows to the size of a forest tree. Pheasants and chuccores, or red-legged partridges, were numerous.

The road rising from the Muggra winds over a shoulder of the hill, past the village of Belee, and then descends for about a mile. After which the party encamped on a small terrace at the entrance of a beautiful valley, cultivated in the lower parts. Below was the village of Phadee, round which the hills expand into a fine amphitheatre. Among the forest trees were hollies and oaks, the latter inferior in size and foliage to the English species. On the banks of the Uglawar, the mountains were. found cultivated for about one-third of their height; the face of the hill being cut into ledges (cates or keats), like steps or stairs, each ledge being about five or six feet above the next to it. The water being retained successively in each cate by an enbankment, to the depth of two or three inches, and let off into the next by its removal.

The inhabitants of this valley appear well off, with plenty of buffaloes and sheep; their dress is entirely of blanket stuff, and consists of trowsers and a kind of tunic, with a loose blanket thrown over, and fastened on the breast with a large steel or brass pin; the head-dress is merely a long blanket cap, rolled into the form of a turban, and fitting the head at the top like a skull-cap.

Our party stopped at a halting-place called, after a temple,

Bewaunee, the nearest village to which is Thaun, from whence they obtained supplies. White and red raspberries grew in the vicinity. The Jumlee torrent is here crossed on a sango or pine bridge. As they advanced along a road which sometimes followed the bed of the stream, and at others ran along the face of the cliff, the country became wilder, and the hills entirely bare towards the top, though cultivated below. Huge isolated deodars (*Pinus deodar*), which resemble the true cedar, and are confined to great elevations, were observed springing from the bare rock, where no other tree could find root. The kaukur or barking deer, and the ghurl or wild goat, are found on the hills near this. After passing the prosperous village of Bàlà, having seven or eight good slated houses, they came to Morarra, a miserable village on a bleak hill, but with some cultivation in the valley. Here Captain Johnson was taken ill, and on the third day was carried by coolies on poles, in the continuation of his journey. The road lay up-hill to the Corassoo Gorge, and then descended for four and a half miles along the face of the precipice, past the village of Laloorie to the Nagun Gadh, a pretty copious stream at the foot of the Janda'gan hill. The party crossed it, and encamped at the opposite side. The country around was well cultivated. At the top of the gorge the forest trees were oak, pine, and rhododendrons. Here our traveller was again obliged to rest on account of ill health.

The 1st of May, again travelled in the chair; the road one mile of ascent, and two miles a level and gentle slope, along the face of the mountain, where the Nagun joins the Bagiruttee. The latter river here runs along a fine cultivated valley about half a mile wide. The mountains rise almost perpendicularly from it; and on the western side are three or four comfortable villages. After a pleasant route of five miles they arrived at Barettee. Passing the village of Dhurassoo, our party crossed the Gudoul; and in a cave, a little above the river, found the last survivor of a convent of Jogee nuns—a clean, happy-looking old woman, about eighty years of age, and who gave them odoriferous roses. Two miles of ascent brought them to the village of Pottorrah, where they encamped, at an elevation of about four thousand feet immediately above the Bagiruttee, but could not hear its waters, which in the sunshine looked like a vein of bloodstone.

After about six miles march, alternately ascending and descending, and passing through groves of pines, they came to the village of Dhoondra, small and excessively dirty. The houses, as usual, consisted of three stories; in the lower the cattle are kept, the second is shut up and is a kind of granary, and in the upper the family reside. Below the village the river is confined by two jutting rocks, over which is a sango.

At the village of Mattee, their next stage, the thermometer

stood at 92° in the tent. Crossed the Barettee on a sango, the planks quite decayed, and encamped at the town of Barahat. This day they found an ant's nest, formed of leaves agglutinated by a kind of gummy substance, on the top of a tree. Captain Johnson visited at this place a temple which was destroyed by an earthquake in 1803. There was here a trident, formed of brass, about sixteen feet high; the base of which was a globe of the same metal about thirty inches in diameter. On the octagonal shaft is an inscription, of which Raper, who had a man with him who read Nagni Sanscrit and Persian, could obtain no satisfactory information. The rajah of Nepaul sent a deputation of learned men, some years ago, to examine it, but they also failed in recognising the characters. The inhabitants have a tradition, that the country was once inhabited by, or tributary to, the Chinese Tatar dynasty, and some who have seen the inscription have remarked a similarity between the characters and those of the Chinese.

On the 6th of May our traveller left the Bagiruttee, and turned off to the left to ascend the ridge that separates that river from the Jumna. The road lay along the Barettee Gadh, having a steep ascent to the village of Haila, and then continuing along a glen, where the matting of trees and creepers almost precluded light. At the head of the glen was the village of Kowa, in the district of Salma, surrounded by a wood of deodars, some of which were of an enormous size. The party afterwards passed through a forest of scarlet rhododendrons to the village of Oprekhōt, and crossing a range of hills, descended into a valley, which they left by ascending a steep hill to the pass of Jakeeni Ghati (about nine thousand feet), from whence they had a fine view of the Roodroo Himma-leh—the mountains above Gungootri. They then descended again to the Shialba rivulet, a tributary to the Jumna. The road hence continued down the glen to the village of Kanoora, where they first saw the Jumna; it lay at the bottom of a ravine, fifteen hundred feet below them; and on the opposite side, and at a similar elevation, were the villages of Patra and Thaur. The houses in Kanoora consisted of five or six stories, the uppermost and the roof projecting about six feet all round.

From this place our party began their ascent up the Jumna to Catnaur, a village situated in a small cultivated recess of the mountain, about five hundred feet above the river. The water of the Jumna was of a deep and almost inky blue. The snow was lying in patches on the hills around. Thermometer at sunrise 48°, at noon 72°. In passing through a pine wood they came to a forest of large deodars which had been on fire, and of which nothing but the black and charred trunks remained. The fire had been stopped by the river, on the opposite side of which the trees wore their usual green livery. The road our travellers came from

Barahat is not the shortest, as there is another that descends into the valley of the Jumna, two marches higher up, but which was at this time impassable on account of the depth of the snow.

From Catnaur they proceeded a short distance along the course of the river, which they then crossed on a sango, twenty paces in length and two feet broad. The precipices rose above the river to a height of fifteen hundred to two thousand feet; the bed of which was two to three hundred paces across. The rocks were mostly composed of granite, but some of the masses that had fallen down appeared to be of white marble. They passed the village of Djenec, which lies on a precipitous cliff, surrounded on three sides by the torrent. There was formerly a fort at this place, but it was destroyed by the earthquake in 1803. From this spot they had their first distinct view of the Bunderpouch. Having crossed another perilous sango, they approached the village of Consala, through a thick wood of apricot and walnut trees.

Beyond Consala they crossed the Summa Gadh by a sango, and climbed up the steep cliffs to Kana, a comfortable and well-built village. The road hence wound along, about eight hundred feet above the river, through groves of mulberry, apricot, and walnut trees. A rugged descent brought the travellers to the Rheam Gadh, the water of which forms a cascade of about fifty feet in height, and has hollowed out a course for itself in the face of the cliff something like a chimney open in front.

The road ascended to the village of Bahree, and then again descended to the bed of the Bhurai Gunga, which is nearly as wide as the Jumna, and which they crossed by a sango, continuing their route to the bed of the latter river, which was also crossed on a bridge of similar construction, and which appear to be so much the object of the travellers' dread, to the village of Bonassoo. From the latter place they proceeded along the banks of the river, crossing and recrossing several times; the last time was at the place where it receives the Jmri or Oonta Gunga, a rapid stream which has its sources in the snow of the Bheen Ke Dhar, a versant of the Bunderpouch. The ascent to the village of Cursolu (about nine thousand feet above the sea) was very steep and laborious. Cursolu is a most isolated spot, having no communication with any habitable place except by the almost impracticable path by which our travellers had come. It had nevertheless some appearance of prosperity, consisting of about twenty-five houses, with three or four temples, built like the former of stone and pine, with excellent roofs of carved deodars; and probably two hundred and fifty acres of arable land. The inhabitants manufacture their own clothes (blankets), and seem to want little.

The Jumnotree Glen ran N.N.E. from this, and had a gloomy and repulsive appearance. The peaks of the mountain itself

could not be seen in such close proximity, being hid by the gigantic deodars which threw their vast shadows around the base of the mountain group, and which attained a size, according to our traveller, "tremendous to look at." The party experienced at this place one of those awful thunder-storms which are peculiar to Alpine regions.

There is a route from Cursolu to Looké on the Bageruttee, two days' march from Gungootri, which was impracticable at this season. The path lies over Bheem Ke Dhar, two days in snow, and four without meeting a habitation. Fraser crossed it in July, deep in snow; and estimated the height of the ridge at fifteen thousand seven hundred feet; and at that height, says that the N.W. peak of the Bunderpouch was between seven and eight thousand feet above him.

No one had been for the last two or three years to Jumnotree, so our party had to send people on to make bridges and ladders. On the morning of the 12th of May, they proceeded up the glen to Jumnotree; the cultivated land extended for a mile beyond the village. They then descended into the bed of the river, making their way through masses of rock and loose stones, crossing and recrossing the stream several times, sometimes on sangos, but as frequently wading. The steep ascent of Bheiro Ghati, which they next came to, was made through a jungle of dwarf bamboo and barberries, with interspersed pine trees. They here reached a temple, consisting of three upright stones, with another placed across the top; containing offerings of small iron tridents to the Byram Jee, the goddess of the stream. They descended a steep acclivity of loose stones and clay on the other side, and reached the bed of the river, where it was joined by a small stream which fell from a rock fifty feet high, and under which they were obliged to pass.

Our party proceeded up the river, sometimes climbing steep and smooth rocks, by means of ladders formed by notches cut in pine trees, till they came to a point where the glen is about forty yards broad, and the snow fills up the bottom to the depth of twenty or thirty feet above the stream, which forces its way underneath through "most extraordinary-looking caverns." Cliffs of grey granite rose at the sides, almost perpendicularly, to the height of twelve or fourteen thousand feet; and the huge pines, rooted in the rocky clefts, and overhanging the glen, added in no small degree to the sombre character of the scene.

They pursued their way for about a mile and a half up this fearful ravine, sometimes on the snow, and at times in the bed of the river; for wherever the cliffs were so far separated as to allow the sun to penetrate to the bottom the snow had disappeared. It was in walking in the bed of the river, and on coming to a

narrower part where the snow was unmelted, that they obtained a full view of these "extraordinary caverns." Sometimes the snow had melted away from the heat of the rocks to the height of five or six feet above the stream; while the mass above, being still eighteen or nineteen feet thick, spread in an arch almost the whole way across the valley, or was supported here and there by some of the rocks that rose higher than the others, and served as pillars to this singular icy roof.

On one of the beds of snow our party found the remains of several musk deer and custoorees, which, though very much decayed, still retained a strong odour of musk.

They continued their way up a wall of rock, over one part of which the river precipitated itself with great violence, till they came to the hot springs of Jumnotree. They have their source in a ledge of rock, ten or twelve feet above the bed of the river, and fall down into the stream, covering the rock with a sediment of variable colour, but chiefly yellow, and soft and spongy to the touch. Above the ledge, the hot water forces its way through a cleft in a smoking jet of five or six feet in height, which has melted the snow around to the distance of twenty or thirty yards. The Hindoos bathe in a small basin, where the waters of the river are mingled with those of the hot springs and remain sensibly warm, after which they are marked on the forehead with the yellow sediment of the hot springs. This place was generally considered as the source of the river Jumna, and was the farthest point reached by Hodgson or Frazer; and it was with some difficulty that the pundit was prevailed upon to go any farther, his presence being necessary to secure the attendance of the guides. The party, however, advanced for half a mile over a snow-bed which completely covered the stream to the thickness of thirty or forty feet; this ravine becoming still narrower, till at last they came to an opening where the rocks formed a small amphitheatre, and allowed the snow-bed to expand to about three acres. Exactly opposite, as they entered this circus, was a bare cliff about forty feet high, over which fell a small streamlet, apparently given birth to by the melting of the snow above. It was received in a small basin of granite, and overflowing, forced its way under the snow on which they were standing in the direction of the hot springs. On the left a small ravine was visible for a few yards, but was completely blocked up with snow, and without the slightest appearance of water; above, they had a full view of the mountain, rising nearly four thousand feet, and also coated with frozen snow. This then was the highest point of the Jumna yet attained, and elevated, Captain Johnson supposes, eleven thousand two hundred feet above the level of the sea, the hot springs being ten thousand eight hundred and forty. Pine trees were flourishing

in forests in the snow fifteen hundred to two thousand feet above them.

The vegetation in coming up the ravine was first holly, growing to the size of a forest tree, oaks and hazel, with an underwood of yellow jasmin, rose, and the rhododendron in the clefts of the rocks. Then stunted birch, mixed with barberries, till at last even the dwarf bamboo failed, and nothing was to be seen but the huge deodar springing from the snow, and extending in forests as far as the eye could reach.

The distance from Jumnotree to Cursoli is not probably more than five miles in a direct line, and our party returned without any accident, save the rolling down of the pundit, and two of the guides, for a considerable distance in the snow, and having only suffered from the heat of the sun, and the fatigue of so perilous an undertaking.

Captain Johnson and his companions started without delay to the southward, being anxious to reach the Broang Ghati, the lowest of the passes into Kunawur, before the commencement of the periodical rains. The road by which they had to proceed thither had never been travelled by an European. On their return they visited, at Bonassa, a spot where the river makes a fall of about eighty feet, the rock being a yellow stone like marble. There was a hot spring in the vicinity, the waters of which deposit a yellow sediment, and were found to boil rice.

From Consala they retraced their steps to Catnaur, from whence they proceeded through a forest of pines high above the river, and descended through a cultivated land and alternating jungle to the bed of the Shialba rivulet. They afterwards crossed the Jumna upon a sango, consisting of a single unsquared pine, traversing from the side they were on to a rock in the centre of the stream, and completed by a similar communication from the centre to the other side. They afterwards continued along the right bank, and made a steep ascent of five hundred feet to the village of Thaun. From hence they proceeded southward to the Nugwan Gadh, described as presenting the usual rocky scenery, passed the village of the same name, which was large and populous, and encamped at that of Patra.

Having ascertained here, that there was a shorter road to the junction of the Pabur and Tonse through the Rama Serai—the happy valley—our traveller turned westward at once, and proceeded over the shoulder of the hill to Dookeat, and then turned in a west-north-west direction up the Bunal Gadh. They proceeded about five miles up this glen, which was studded with villages, and cultivated in every square foot of ground. Being the first Europeans who had gone this way, they were the object of much curiosity among the natives.

They crossed the Bunal Gadh, at the village of Goodoori, and continued their road up to the Kanda Gadh, a beautiful glen, abounding in black partridge. After three miles journeying, they arrived at the village of Kanda, on the ascent of the Durstāll Ghati, and in the midst of a forest of various foliage. At the top of the Ghati, they got their first view of the Rama Serai, a fertile valley about a mile and a half, or two miles broad, and which stretches in a north-easterly direction for eleven or twelve miles up to the old fort of Sircote, which is situated on the extreme point of the Kedar Kanta, a lofty shoulder thrown out by the snowy range between the Bunderporah and the source of the Tonse. The Rama Serai was formerly a royal forest, under the native dominion, and preserved as a chase. It is now much neglected and thinly inhabited, the luxuriance of vegetation rendering it extremely unhealthy. The valley is said to abound in leopards, bears, deer, and wild hogs. Tigers have been said to be met with in the same district, but Captain Johnson remarks, that he saw no trace of them, and the inhabitants, who had plenty of bear and leopard skins among them, never alluded to any larger animal of the latter kind.

Four miles beyond the entrance they reached the village of Kundal, near Ghoondeat, which is the largest in the valley. Here they purchased sheep, to drive with them into the hills. Beyond Ghoondeat they ascended a steep hill to the Jermala Ghati on the west side of the valley; they then descended to the north-west, through a forest of pines, leaving the fort of Sircote to their right, passed the end of Kedar Kanta, and arrived, after a rapid descent, at the Gooroo Gadh, a tributary to the Tonse. They were obliged to ford this stream twice before reaching the village of Kursar. The inhabitants here had never seen Europeans.

At the foot of the Gooroo Gadh, they had their first view of the Tonse, which was then a deep and strong flowing river, twice the size of the Jumna, the waters discoloured by the melting of the snow. Having crossed the river in a sango, they encamped, up its bed, at a place called Ghoon Khatra, but where there is no village. The scenery presented the usual peculiarities of rugged rocks, and nearly vertical cliffs, with pines springing from the most barren spots, forests of the same trees, with an undergrowth of strong gramina, and occasional patches of greensward.

Our party left the Tonse by the Marmoor Gadh, a small stream in a dark and gloomy glen, overgrown with grass and weeds, and at the source of the stream they made a very steep ascent to the right, which brought them to Petri, a little village, perched almost upon the top of a stony peak. Apricot trees grow around the village, and black partridges and chuccores were calling in all directions.

From Petri they continued across the hill to Sorass, from whence another short ascent, and a deep fall through beautiful woods of silver fir, brought them to the ascent of the Balchoo Kanta. The difficulty of this ascent was much increased by the immense number of fallen deodars, whose trunks were mostly from sixteen to twenty feet in circumference, and which constantly impeded their progress.

From the Ghati or gorge of the pass, they descended through fine forests to the Chighin Gadh, a tributary of the Pabur; halted at Gokal Khoti, a village a few hundred feet above its bed, afterwards crossing the stream which they followed to its junction with the Cuneat Gadh, a large and rapid torrent, passing the village of Dooghull; they crossed the latter stream on a sango, and had a long and laborious ascent to the village of Kirwan, which is very poor and mean, being about three thousand feet above the Pabur, and built among immense loose masses of rock, some of which appeared as large as the village itself. Apricot trees grew around, and lizards were seen in great abundance. A short march from hence, on the side of the hill, brought them to Azalt, prettily situated in view of the Pabur, and with much cultivation around.

From Azalt they made a rapid descent to the Coomoan Gadh, and then ascending the opposite valley, crossed the brow of the hill into the valley of the Pabur. The ascent from this continued by Mundul, a large and populous village, to Kontan, two thousand seven hundred feet above the river, and seven thousand eight hundred and ninety-eight feet above the level of the sea. The turf on which they encamped at this elevation, Captain Johnson compares to that of our own peat bogs. Our traveller was obliged to halt here for a few days, being again an invalid, and the whole party were severely incommoded by a small fly, about the size of the sand-fly, and very numerous.

The Pabur is a wider stream and not so much of a torrent as the other rivers, nor do the mountains rise so perpendicularly from its bed, but slope gently for the first three thousand feet. The whole is richly cultivated, and dotted with villages, each shaded by its own grove of apricots and walnut trees, while beyond the line of cultivation, the pine-woods rise to the top of the hills in one thick mass, only broken by an occasional greensward, where the villagers send the cattle in the day-time.

On leaving Mundul, our party proceeded by Racengurh (a station for a few Gorkhas) to the village of Hant, being a descent altogether of about three thousand feet, in a distance of about four miles. The road up the Pabur, from this to Roroo, a thriving village, was the best they had yet met with in the hills. From hence to Murlla the route was rocky, barren, and uninteresting;

and from this village they made a short excursion to Chegong, to obtain provisions. After crossing the Andreyti, the western branch of the Pabur, which flows from the foot of the Shatool pass, they ascended to Pekal, and from thence to Tekree, where the scenery became more beautiful. Jaen was the farthest village up the glen, and after a long ascent they reached the top of the ridge. The river at the foot of the mountains made a sudden turn, so that the road, taking a northerly direction, brought the vast snowy range before them in all its magnificence.

A most splendid fall of water was observed at the head of this glen; several streamlets unite a few hundred feet below the line of snow, and falling over a solid wall of rock, make only two shoots down to the bed of the Pabur, a distance of about fifteen hundred feet. The first is the longest, and for some distance the waters keep in a tolerably compact mass, but which soon separates into white foam; lower down, even that disappears, and before it reaches the ledge could not be seen at a distance of half a mile. It reappears at a great distance below, reuniting in a short channel, from whence it makes another shoot to the Pabur.

On the road to Leeti they came to the region of alternating patches of grass and snow, and the "last trees:" the trees so called by courtesy are a few stunted boge patras, a kind of birch, that had not yet put forth a leaf. Wherever the snow had lately melted, the ground was covered with polyanthuses. The river is here covered with a bed of snow to a very great depth. Captain Johnson remarks, that what he calls a snow-bed corresponds with what in the Alps is called a glacier—the snow-bed of the Pabur being larger, but very similar in appearance to the glacier of the source of the Rhone.

They approached the Brooang Pass through the snow, only interrupted by the Pabur, which burst from the snow-bed at an elevation of twelve thousand nine hundred and fourteen feet, and fell over a piece of bare rock for about fifty feet. It was again immediately lost in the snow. Later in the season, the Pabur is said to flow from a clear lake about half a mile wide, which was now frozen over and covered with snow. After three hours laborious exertion, they reached the top of the pass (fifteen thousand three hundred feet). Our travellers had here a most magnificent view. On each side, to the north and south, the snow spread as far as the eye could reach; and east and west rose the peaks of the giant Himma-leh, to the height of four or five, or as much as seven thousand feet above them. Those which were least precipitous, clad to the summits in their white shrouds; others, as Kuldung (twenty-one thousand one hundred and three feet), rising in naked bareness, their cliffs too precipitous to afford a resting-place for the snow, and presenting nothing to the eye but vast pyramids

of bare granite, round which the clouds were fast gathering in sombre array.

Amid the thunderstorm they were obliged to hurry their way, running or skipping down the snow, till, after an hour's toil, in which they had gone about six miles, they reached the first trees on the north side, and took refuge under a hanging rock. Some of the Jaen people alone arrived that evening, bringing with them a small tent and some provisions. Some of the coolies came in, in a state of stupor, towards night, and the lighting of the fire brought in the remaining stragglers. Dr. Gerard was overtaken by one of these storms in the Goonass Pass, some miles east of this, when he lost two or three of his people, who died of cold, and he himself escaped only by indomitable exertion, having the flesh frozen off his toes; and with the loss of all his mathematical instruments, some of which were found the next year.

In their descent for Brooang, they passed forests similar to what occurred on the south side; and they measured a deodar, which was thirty-three in circumference, and from which the branches did not spring for a height of between sixty and seventy feet. Brooang is a pretty large village, situate at the junction of the Bulchutter and Buspa; the last, a large river, takes its rise four marches E.S.E. on the north of the Himma-leh, in Bhurassoo, and falls into the Sutluj, ten or twelve miles below Pooari.

Our travellers were now in Kurawur, according to the natives; the people from the other side call the country the Būdh Mooluk, —evidently the origin of Budhtar, and consequently the confines of Thibet. This day they saw the first *yak* which they had met with. The road along the river-side was dangerous and difficult, every trace of a path being at times obliterated. Near the junction of the Buspa with the Sutluj, they crossed the former on a sango. The Sutluj was confined between cliffs of vast height, and nearly vertical: it was about sixty yards wide. The waters were almost whitened by the quantity of sandy detritus which they bore down with them.

Our party followed a dangerous path on the face of the precipice to Kallah, a small village in the recess of the bank, surrounded by groves of apricots and vines. Out of seventy followers, all but twenty absconded from our travellers at this point, from dread of further dangers, and prejudices against visiting new countries.

They passed the village of Barung on a high rock under the Harung Pass, and, continuing along a bad path on sandstone, came to the beautiful little village of Pooari, situate beneath the wild Kuldung—embedded in a growth of apricot, peach, vine, and walnut trees; and still more strikingly luxuriant from the force of contrast.

The Sutluj is here about eighty yards wide, deep, and unin-

terrupted by rock, but flowing strongly, and dotted with whirlpools and backwaters. On the hills opposite, for a fourth of the way up, vine-trees clothe the rock, carefully trained on trellis-work; for a short way above, were the plantations of corn; higher, and covering half of the mountain, were the dark pine forests, and these were crowned by a diadem of snow. Below were the villages of Koongy and Telingee, built, as most villages were, on the points of cliffs projecting over the river, and shadowed by their deep groves of walnut and apricot trees. The inhabitants, like many mountaineer tribes, are extremely dirty in their habits.

From Pooari our party crossed the river by a rope-bridge, or Jhoola, to Telinga. In travelling thence to the large and populous village of Punjee, they left the pine forests to enter into tracts covered with a kind of wild camomile; and, after crossing a mountain torrent on a sango, reached the village, where they halted for two days.

Their road continued to the north-east, high above the river, and from whence they had some fine views of the snow range;—Rulding being most conspicuous. Captain Johnson thought that a peak of the same group, though nothing like so rugged in aspect, was in reality higher. It lay between the Sutluj and the Buspa; and over one of its shoulders is the Harung Pass. The rocks were full of eyries, and the eagles came down in parties of three or four to look at the strangers.

After the ascent to the Laptōk pass, they descended to the bed of the Leesa, which was bridged over with snow, formed by an avalanche that came from the top of Oorung Teefa, and had torn a passage for itself through the pine forests of some hundred yards wide. There is a well-built wooden hamlet, bearing the same name as the stream, on its banks.

In the next day's journey, lying due north, they met with traders in salt, driving south. Sheep and goats are the only beasts of burthen in the mountains, and they carry salt or iron in saddle-bags, in return for corn. They are attended by large and fierce dogs, with long silky black hair. The yak had now become common enough; and they saw on the road large black-faced apes, about three feet and a half high. Our party arrived, through beautiful pasture ground clumped with pine-trees, at the village of Labrung, about two thousand five hundred feet above the Sutluj. On the opposite side of a ravine was the city of Kanum, a very large place, situate on a fine table-land, surrounded by rich cultivation. The houses were flat-roofed and clustered together; some of them seven or eight stories high, and looking like watch-towers. The town is eight thousand nine hundred and ninety-eight feet above the level of the sea, and the temperature in the shade delightful. There is in this city a Lama temple, and an

excellent library, said to contain a copy of every work to be found in the great library at Teshoo Loombo. Here they met with Tchoma da Coxas, an Hungarian traveller, who was there for the purpose of ascertaining the origin of the Huns. He came through Persia and the Punjaub; and some years before this presented himself on our frontier, and requested either to be forwarded to Ava or to be allowed to reside some years in Thibet. He had been in Luddak, and had acquired a knowledge of the language, but having become an object of suspicion, he had come south, and buried himself in the library at Kanum. He said that he had made some curious discoveries, and among others, that he had found translations of some of the classics—among the rest a very accurate version of Virgil. He was not very communicative, and lived the life of a hermit, upon an allowance granted him by the Company.

Our travellers left Labrung on the 23d of June, and began the ascent of the Kurung Ghati, and encamped that night at an elevation of about thirteen thousand feet. They, this day, to their great disappointment, received from the officer commanding at Soobathou, Lord Amherst's order, prohibiting, in the most positive manner, all attempts to proceed beyond the boundary of Hungrung, for fear of exciting the suspicions of the Chinese. The next morning they reached the top of the pass (fourteen thousand five hundred feet). The snow lay deep on the north side, but did not extend far down. In their descent they visited Soongnam, a large and populous village, situate in a small cultivated valley, but at this time very hot: thermometer rising to 95° at noon. This place is under the Lama theocracy; and they do not burn, but bury their dead, and heap together long piles of stone, with the slate inscribed with the 'words of power,' as tributes to the deceased. The tumuli are arranged with a road on each side, to allow travellers to comply with the invariable rule of leaving them on the right hand.

The Durhony and Boukeo rivers unite at this point to form the Ruskolang, a tributary to the Sutluj, which river it joins at the village of Sheapoo, a Wuzzier's residence.

They ascended for about two thousand feet from the bed of the Boukeo, over a desolate country, the flowering plants of which were camomile, mint, and a few other aromatic plants, and the shrubs juniper, sweet-briar, and a kind of wormwood; and then proceeded by a winding path to the top of the ghaut (fourteen thousand eight hundred feet). Scenery as usual; the rock slaty, and mostly covered with snow, and little or no vegetation. A rapid descent of three thousand four hundred feet brought them to the village of Llango, the inhabitants of which had flat Tatar noses, and were clothed in Tatar black and red blankets; and the lan-

guage differed from that hitherto used. Indeed, it had retained some mixture of Hindoostanee only as far as Soongnam.

Our party approached the village of Tooling, through a slaty formation, where the rivulet, whose banks they had been following, joined the Speeti, or great western branch of the Sutluj. On the west were the peaks of the Tuzeegung, or Punjeool, where Gerard effected his ascent of nineteen thousand four hundred and eleven feet, in 1818. Though much earlier in the season, and consequently in the expectation of great difficulties, our party resolved upon undertaking this interesting ascent. The first village in the Speeti is Leo, and around it is some cultivated land and native vegetation—a rarity in this region of rocks and precipices. The male inhabitants wear club tails, and shoes of tan leather, made very like a tub. They do not tan leather north of Pooari: some which our travellers saw had the Russian mark on it. The hills were tilled with yoked sheep. From hence they crossed the Speeti, or Tulukna, on a sango, and effected an ascent of four thousand feet to the village of Nako. The rocks around both Leo and Nako are almost entirely destitute of vegetation, and lie in huge broken masses and " perupt crags," cast about in disorder, as if by the influence of subterranean force. There are three temples built of red brick in Nako, in one of which our travellers took up their residence and made their preparations. The natives endeavoured to dissuade them by exaggerated accounts of the difficulties, and of the dangers of the " bis " or poisonous wind blowing on the snow.

On the 1st of July, at five o'clock, P.M., they began their ascent, and taking their course up a ravine that led from the village, they turned up the hill to the right, and attained, after an hour's ascent, one of the shoulders of the mountain; and another hour brought them to where their tents were pitched, on a level spot under a stony ridge that crossed the way. The view from this spot was very magnificent; and in the stillness of the air, the waters of the Speeti and the Sutluj, which the ridge divided, could be heard, though about fourteen thousand six hundred feet below their encampment. Stunted grass and furze grew around. They started next morning at six, having waited an hour for the sun, and reached in three-quarters of hour an extensive table-land, the running streams thickly covered with ice. In the ascent beyond, the snow gave way enough to afford a footing, but sometimes so much so as to let them in up to the waist. One of the party, Captain Browne, sunk nearly to his mouth, and being behind was not heard for some time, when he was extricated from his perilous and fearful situation. The snow-bed, after an hour and a half's progress, changed its plane from an angle of about 15° to one of 75°, rendering farther progress in that direction im-

possible. They accordingly veered round to the right, making directly up the mountain, and in the first part of the journey experienced much difficulty from the hardness of the snow. They, however, effected their ascent to the ridge above. When the clouds cleared away, they found themselves on the brink of a precipice, which, though nearly eight thousand feet above the bed of the Sutluj, Captain Johnson thought coûld not be more than five hundred yards horizontal distance. "It was amusing," our traveller remarks, "to see with what alacrity, when the veil was drawn from before them, each recoiled without saying a word, and placed the ridge between him and the fringe of snow which hung over the precipice like foam on a wave, and from which long icicles hung pendent, as they afterwards ascertained by cautious explorations on hands and knees."

From hence they advanced along the ridge, the snow affording them a good footing; a narrow strip of rock projecting from this ridge like the neck of a bastion, advancing towards the Sutluj, which opposite to it made a detour to the east; and, at the extremity of this isthmus, the peak rose in the shape of a cone of bare granite, the snow being only lodged on a few ledges and breaks in the sides. Our travellers ascended a mound at the entrance of the isthmus, where they were on a level with the base of the peak. The north-east peak of the mountain, elevated by some hundred feet above the latter, was now visible at an horizontal distance of about two miles.

Captain Johnson had afterwards an opportunity of comparing notes with Dr. Gerard, and he felt satisfied that this was the same spot as that on which this gentleman made his barometrical observations, and nineteen thousand four hundred and eleven feet above the level of the sea, the villagers having attempted to impose upon him by pointing out a much lower spot in the place*. Humboldt's station in the Andes was nineteen thousand three hundred and seventy-four: only one man reached this point with our European travellers. The villagers grasped their windpipes in both hands, and lay down in the snow; and the nuzzeer sepoy, who alone reached the highest station, also complained very much. It is remarkable, that our travellers did not suffer any inconvenience excepting an occasional difficulty of drawing breath. Even in their night-camp it was almost impossible to draw a cigar. They suffered, however, severely from blistering of the skin of the face and neck; and one of the party was snow-blind for a few days.

* The same altitude taken geometrically, in 1821, gave nineteen thousand four hundred and forty-two feet. Dr. Gerard has since this explored the pass at the N.E. frontier of Khoowawur at an elevation of twenty thousand feet.

Our party descended from their lofty situation in a direction different to their ascent, and reached the village in three hours and forty minutes from the time they left the top.

The travellers remained at Nako from July 2d to July 15th, the inhabitants of which village were attentive and obliging. They spoke Thibetian, and had high cheek bones and flat noses; and followed the worship of Lama. The cultivation is the same as in the hills, and the women are made to do all the hard work. The only fruits were gooseberries and apricots; from the stone of the latter they make excellent oil.

On the 15th they continued their route northwards;—country desolate and stony. The slaty-grey pheasant of the hills abounded: Captain Johnson says he never saw it at a less altitude than twelve thousand feet, and it retreats higher as the snow melts. On the route to Chango, the rocks were rounded and water-worn, as if they had been long washed by a torrent. The vegetation around consisted of rose, gooseberry-bushes, some whins, and a few stunted cedars. Chango is so surrounded by mountains, that, though built in a recess by the river-side, it was insupportably hot. Tartary oats were growing around. Wood-guests, and a crow with red legs and beak, were met with at the same place.

They crossed the Speeti, to the north of Chango, and proceeded along its banks to Shealkhur, the boundary foot of the Bishur country. It is merely a cluster of houses surrounded by a high stone wall, situate on a bold brow, commanding the passes into Luddakl. There was no garrison. The rock around bore every appearance of having been subjected to the action of fire, either volcanic or the burning of cliffs (anthracitous ampelites, with sulphuret of iron). Our author mentions black ashes, earth burnt to brick, pieces of tile, and stones welded together—the slaty rock being only burnt on the surface.

Our party left Shealkhur early, and after a tedious ascent of about an hour and ten minutes, came into a country characterized by low and rounded hills covered with long coarse grass. From hence they descended into a deep ravine, formed by the Chalodockpo torrent, and then arrived, along a good road, at Changreejing, an out-farm belonging to Chango. The hills around diminished in ruggedness, but the vegetation consisted merely of stunted deodars and a few poplar trees.

On the 19th they walked out in the direction of Shucktul, the first village in the Chinese country. The ravines were clothed with willow coppices, sweet-briar, and currant-bushes. A pyrocantha was seen creeping over immense masses of rock.

They were now, according to the best information they could get, within three or four marches of the pasture country, or high steppes of Luddakl. Beyond the Chemoreel, about eight days' journey

from this, the low hills are separated from the Valley of the Indus, or, as it is called, the Singecho, by a rugged but not lofty range of hills. On the banks of the Indus, and in a fine open valley, is the town of Leh, beyond which the hills rise again; and the knowledge of the guides did not extend beyond a snowy range of mountains which were said to be higher than the Himma-leh, and to which they gave the name of Kailas or Cailas, which signifies "heaven." Captain Johnson does not think, that, in advancing to the west, they would have met with any opposition to the continuation of their journey, and it was with much regret that, in obedience to their orders, the party set out on the 20th on their return, by Chango, over the Changrung mountain.

They again reposed themselves at Nako till the 1st of August, when they proceeded to Leo, and thence to Hango, having provided themselves with mountain ponies.

From Punjee, whither our travellers proceeded by the road they had followed before, they kept along the western bank of the river,—passing by Cheeni, a village prettily situated, though dirty in itself, and surrounded by the usual fruit-trees—to Rhogee, which is the limit to which the periodical rains extend; and beyond which vineyards disappear. Their journey here was effected by alternate ascents and descents in flights of stairs cut in the solid rock, except in one case where they traversed a pine wood. On the road to Meru, the path winds along a precipice about four thousand feet above the bed of the Sutluj, from which, if a perpendicular were erected, it would pass within one hundred and fifty feet of the path, which in many places was scarcely a foot in width; in this respect, very different from the twelve-feet road described by Sir Robert Porter, with so much horror, in the passage of the Goodjara in the Caucasus. Nothing but the greatest confidence and coolness could have brought our travellers in safety over such passes, which were very frequent in the mountains, but more particularly along the banks of the Sutluj.

In descending from Meru, they got into the long grass jungle again, crossed the Oola Gadh on a sango (in accomplishing which one of the sheep fell over and was lost in the stream), to the village of Oornee.—Jungle, composed of grass and nettles, rising higher than the head. The road continued through woods of evergreen-oak to Chegong, where they got fowls and honey. They started hence in the rain to the bank of the Sutluj, which is here very rocky, and the current rapid; proceeding along its bed, interrupted by a very high rock which they were forced to climb, to the bed of the Bobbeh Gadh, estimated by our travellers to have a fall of a thousand feet in the single mile of its course that was visible. Beyond this they arrived at the made road, or artificial causeway, which was a great relief. The rocks which they had

latterly been travelling amongst were slaty and of a soft texture. They now crossed the Sutluj on a fine broad sango, from which they ascended to the village of Nachan. From Nachan they travelled through deep brushwood, eight or nine feet high, by the little village of Soongra, which has a small Chinese temple of carved wood in it; crossed the Boorhee Gadh, making three fine falls within sight, and ascended towards Tranda. On the ascent; Captain Johnson nearly lost his pony, his hind legs having gone over the precipice. In a deodar wood by the road-side, they saw great abundance and variety of monkeys.

The road descended from Tranda, and then again made alternate ascents and descents to Tuarra, which they passed through, and descended, seven thousand two hundred and forty-eight feet, to Seram, where they encamped near the rajah's palace, which our traveller compares to an English barn adorned with gilt ornaments. The shawl goats, which they had brought with them from the mountains, were suffering much from the heat, and many were already dead. On leaving Seram, our travellers found the bridge swept away from over a torrent towards which they proceeded, and by the side of which, amid heat and vapour, they had to stay nearly five hours while a temporary sango was made. After the ascent on the other side, they had a delightful walk, through woods of various and beautiful trees, to Goura Koti, where they took up their quarters in the verandah of a tomb. Country around cultivated, or covered with pine forests.

The next day they arrived at Rampore, the capital of Bishur, built on the bank of the Sutluj, in a cavity of glittering rock, which renders it one of the hottest places in the north of India. The houses are built in squares, each house inclosing a court-yard, with verandahs and galleries round it. They are roofed with large blue slates, very thick, and laid loosely upon the rafters.

On the 14th, they marched to Dutnugger, the road chiefly level, and the hills rounded and low; from whence, in proceeding to Kotghur, they took by mistake the road by Cohmarsein, a village on a ridge between two valleys which came down from the Naig Kunda Pass, and constitute the dominions of a petty rana, who is much esteemed among the hill-chiefs. Our travellers were invited by the chieftain's son, in English, to stay at his father's house, but they preferred going on to Kotghur, which they reached after a tiresome and long day's journey. Here they were received at the house of Captain Gerard, which was beautifully situated on the side of a cultivated mountain, clothed in the upper part with pine forests. It was about seven thousand eight hundred feet above the sea, and four thousand above the bed of the Sutluj; thermometer never rising above 65°, and the snow only lying

during a month or six weeks, at a depth of three or four feet. Bears were numerous in the woods, leopards were often seen, and hyenas were very common and peculiarly daring. Captain Gerard had two gardens, one on the banks of the river and the other at his house; in the one he cultivated European vegetables, and in the other the plants of India.

'Having rested for a few days at Kotghur, our party started, through wild pine woods, to the Naikgunda Pass; on the top of which was a bungalow for the accommodation of travellers. The pass is elevated nine thousand and sixteen feet above the sea. They were delayed some time at Naikgunda by the perverseness of the coolies or porters. Our traveller complains bitterly of the difficulties which they met with, and the bribery and corruption that is practised, in the territory of the Company, and which is not met with on the hills. On this subject he remarks, with much justice, that the stupendous journey of Dr. Gerard and the labours of Moorcroft sufficiently attest that our ignorance of the remainder of this most interesting country must be entirely attributed to a want of exertion on the part of the authorities, and to the little encouragement that is held out by them to undertakings of an exploratory character.

They now proceeded to the bungalow of Muttiana, which stands high on a bare point above the village of the same name, where they found the quills of porcupines. Thence they proceeded along the crest of the ridge, from which they had a fine view of the mountains behind them. Viewed at a distance, says our traveller, sufficient to obtain a comprehensive sight, the chain appears to maintain a nearly equal height in the great masses, but about every tenth peak shoots up, mostly in a sharp or angular form, terminating in an aiguille, which would be inaccessible even if its base rested on the plains. Many of these peaks lean over to the north-west, as if moved from the perpendicular by a force acting in the same direction, forming an angle of little more than 45° with the horizon.

Passing by Phago and the mountain of Choor (twelve thousand six hundred feet) in Sirmoor, they reached Semlah, where there are some good houses on the Jacko Ridge, which are pleasantly situated in woods of rhododendrons, and are recommended by our travellers for summer residences; though thunder-storms, of great violence, are said to be frequent. Hence they marched to Lairee, from which they had their first view of the plains over Sabathoo. Passed the fort and village of Hurreepore, to arrive at the latter town, which is surrounded by sandy and desolate hills, and is a station for a Ghoorkha battalion. The village is much infested by snakes and centipedes; the most common of the former is the

spectacle snake, or cobra di capello, the lethargic effect of whose bite is so well known. Eagles, not to be compared in size to the gurrit, are very common; and vultures and white kites abound, as on the plains.

On the 1st of October, our travellers made their last march on these hills, the country gradually becoming less wild as they approached the spot where the mountains were lost in the plains of the low country. On the same evening they left these fine lofty regions with heavy hearts; and entering their palkees, which they found at Bahor, they commenced their journey through the alternating sands and jungle of the north of India.

REMARKS.

Descriptive Geography.—The great chain of the Himma-leh mountains extends in a direction from N. W. to S. E. for about 2000 British miles. Its continuation to the west, called in modern times the Hindoo Coosh, or Indian Mountain (by De Humboldt considered as the prolongation of the Kuen-lun), was the Emodus of the Macedonians and the Imaus of Pliny, and was in those days, perhaps, also called Himma-leh, as the Greek title was borrowed from the Sanscrit.

The culminating points of the chain of the Himma-leh are known to attain an elevation exceeding 28,000 feet. The lowest of the passes, the Tungrung, is 13,739, and the loftiest, to the N. E. of Khoonawur, is 20,000 feet, which would give a relation of the mean height of minimum of crest to the culminating point of 1 : 1.6$\frac{4}{8}$. De Humboldt found it some years back as 1 : 1.8.

The Himma-leh, in its prolongation eastward, is, according to Colonel Kirkpatrick, called Humla to the north of Yumila, and beyond the Arun, according to Hamilton's map attached to the History of the Gorkha war, the Harpala Mountains. Klaproth and Abel Rémusat have collected from Chinese writings the continuation of the chain in snow-clad peaks to the west of Young-tchan. These turn abruptly to the north-west on the confines of Hou-Kouang, advancing ultimately, —according to De Humboldt, who seeks in descriptive geography for the evidence of the elevation of mountain-chains on longitudinal fissures,—into the sea, at the volcanic island of Formosa.

Geology.—In geology and mineralogy, the observations which Captain Johnson has made assist in corroborating the previous information that had been obtained of the structure of this great Alpine chain, and which appears to present much variety in composition, and phenomena that are in accordance with what has been observed in other places. It would result from the facts recorded by Hodgson, Fraser, Gerard, and our traveller, that granite is more particularly common at the foot of the mountains, and thus, probably, constitutes the base of the chain. It has been asserted, that the predominance of gneiss in the Himma-leh gave to it a secondary constitution; neither has this predominance been established, nor, if it had, does it take away from the primitive and crystalline character of the rocks forming the base

of the chain. From the plains—through the first and second ranges of hills—to the great chain itself, there appears to be a series of bands of supermedial rocks succeeded by sandstones and limestones, and transition rocks (clay-slates and ampelites) reposing alternately on mica slate, gneiss, or granite. In the centre of the chain there are masses of limestone and intermediary rocks locked here and there in upraised crystalline formations (as the sandstones on the northern slope); and these crystalline rocks are found bearing upon their elevated summits and indented ridges rocks of a very modern formation. Thus sandstone has been found at 16,700 feet, ammonites in limestone at 16,500 feet, limestone at upwards of 20,000 feet, and Captain Johnson found clay in the Hungrung pass at 14,000 feet. This elevation of sedimentary rocks, with organic remains or the detritus of former worlds, upon the summits and acclivities of the loftiest mountains in the world, is what is also met with in the high Alps of Europe, both in Switzerland and in the Pyrenees, and the character of these formations, the number of them which have been raised up, and the age of the external beds (in geognostic chronology) indicate the epoch of the elevation of the mountain-chain as compared with others, and has been further observed with regard to the influence which the same relative age had on the direction of the chain as compared to the meridians or parallels of our own spheroid. Captain Burnes has also found the geological character of the Hindoo Coosh to be pretty similar to what we know of the Himma-leh, namely, that the loftiest peaks are composed of granite or gneiss, with associated mica slate, and quartz rock, and intercalated uplifted or outlying conglomerates, sandstones, and limestones, white and sacharoidal in the chain, shelly in the plains.

Zoology.—What Captain Johnson has remarked upon the distribution of the few animals met with during a merely exploratory journey corresponds with the little that is known of the zoology of these almost inaccessible wilds.

The yak, which our traveller often alludes to, is the Bos peophagus, Bos grunniens of old writers, the grunting ox of Shaw and Pennant. It is domesticated over a vast tract of country from the Altaic mountains to the central part of India, and even a great portion of China. It pastures, according to Turner, on the coldest parts of Thibet upon the short herbage peculiar to the tops of mountains and bleak plains. This animal is of great value to the Tatar tribes. It is an excellent beast of burden, and its milk is abundant, and very productive both of butter and cheese. The horse tails used as standards by the Persians and Turks are made of the hair of their tails, and chowries or fly drivers, employed in India, are formed of the same material. Hamilton calls them changri cattle. The bull is named yak; the cow, dhé.

The ghurl or wild goat (Capra ægagrus) is considered by most naturalists as the parent of the domestic varieties of the goat tribe. In this case, which is yet doubtful, the Cashmere goat, the Thibet goat (Capra Jemlahica, Ham. Smith), and Blainville's Capra cossus, and

the Nepaul goat would be only varieties. Mr. James Wilson, who has specially devoted his attention to the originals of our domestic animals, (Quart. Journ. of Agriculture, Edinburgh,) is of opinion that the goat of the Jemlah chain cannot be referred to the Capra ægagrus of Pallas.

Among the deer tribe, Captain Johnson uses native appellations, which we have had a difficulty in referring to our natural historical classifications. It may be well to briefly enumerate the recognized species of this tribe inhabiting the chain of the Himmah-leh or its immediate neighbourhood. Among the Moschineæ, the musk deer, Moscus moschiferus, *xé* of the Chinese. Musk is chiefly obtained from Thibet, probably more from the commercial enterprise of the inhabitants than the predominance of the musk deer in the mountainous regions of that country. Our traveller found the accumulated bones of several species at the foot of a cliff near Jumnotree. Among the Cervineæ—the Nepaul stag (Cervus Wallichii) of a yellowish brown grey, with a large pale-coloured disk upon the croup. The black deer—also met with in the hills of Nepaul. This is the Cervus Aristotelis of Duvaucel, and one species of the Capreolinæ, the Cervus capreolus, frequenting the crags and ravines of the frontier. Of the antilopes, probably a great number may be found in regions possessing so much variety of climate. A remarkable species, the *chiru*, (Antilope kemas, Smith,) which has been looked upon, from having frequently only one horn, as the origin of monocerotes, licornes, or unicorns, and the goral of the Himma-leh (Antilope goral, Hardwicke, Lin. Trans. vol. xiv.) In allusion to the Tetraceri of Leach, Wilson asks, "Is the Antilope quadricornis distinct from the Antilope chickara?" If from the examination made by Blainville of a cranium from India, the anterior horns are straight in the one and curved a little backwards in the other, the hinder ones straight in the former and curved forwards in the latter, there are probably two species, the striated character of the base belonging only to the latter. Hence we should have, as Lesson has adopted, the Antilope quadricornis and Antilope chickara—the Tetracerus striaticornis of Leach.

The nyl-ghau (blue ox)—(Antilope picta) is a vicious and remarkable animal, of which several specimens have lately been exhibited in this country, and has hence become familiar.

Of the birds noticed by Captain Johnson, we have only to remark, that the gurrit, which he was inclined to look upon as a condor, was, no doubt, the lammer-geyer (Gypoetus barbatus), whose geographical range is so extensive, and of which a specimen, according to Mr. James Wilson, has been transmitted to the Edinburgh Museum from the Himma-leh mountains. The chuccoree, according to Hamilton, is the Perdix rufa, or P. rubra, Brisson. The cuckoo (Cuculus canorus), which our traveller heard in the mountains, was also noticed by Turner in Bhootan (Embass. p. 57). The southern acclivities of the mountain range are the abode of two very beautiful birds, the Impeyan pheasant or monaul (Lophophorus refulgens), and

the horned pheasant (trapogan), of which Mr. Gould has figured a new species—"Century of Birds, &c." The red-legged crow observed on the Speeti was, no doubt, the Coracias graculus (Pyrrho corax, Tem. Fregilus, Cuvier,) and the wood-quests or wood-pigeon the same as our own bird. On this subject it may be remarked, that not even in the vegetable kingdom do the number of analogies presented between the productions of the temperate climates of the mountains of central Asia and the plains and hilly regions of our own latitudes exceed in interest and in importance what is contained in the striking identification of the birds of the Himma-leh with those of western Europe. Flies, resembling the sand-fly and similar to what Captain Johnson's party were incommoded by on the Pabur, are mentioned by Turner as occurring about Murichom, where most of the people were marked by them.

Vegetation.—The teak (Tectona grandis), mentioned by Captain Johnson as composing, with the leesoo and some pines, the vegetation of the jungle of the Deyrah Dhoon, belongs to the natural family of the verbenaceæ, is one of the largest Indian trees, and is valuable for its excellent timber. The vegetation of these jungles appears to vary very much in their trees and shrubs as well as in their gramineous plants. In nearly the same latitudes in the Taryani or plain regions of Nepaul, the most common trees are the Palas (Erythema monosperma) and the simul (Bombax heptaphyllum, Lam.). The lower part of the hilly region of Nepaul, and some of the adjacent plains, are the seat of the saul forests (Snorea robusta, Roxburgh).

The mango (Mangifera Indica) is a large tree with foliage somewhat resembling a chestnut. It constitutes (Greville, in Hist. and Descrip. Account of British India, vol. iii. p. 165) one of the most frequent and pleasing features in Indian landscape. According to Forbes, mango and tamarind trees are usually planted when a village is built.

The jack (Artocarpus integrifolia) is a larger tree than its generic associate, the bread-fruit tree (A. incisa), the trunk, according to Roxburgh, being from eight to twelve feet in circumference. The fruit is not much esteemed as an article of diet, though the natives of Ceylon eat it freely (Greville, lib. cit.), and it is a common food among the Bhootans (Turner, Emb. to Thibet).

The growth of trees and plants and of fruit-bearing trees, analogous and even similar to those met with in our own climate, among the mountains of the Himma-leh, has now been established by accurate botanical researches. We find the narrative of Captain Johnson abounding in notices of groves of apricots, walnuts, peaches, cherries, pears, and apples, and the occurrence of currants, gooseberries, barberries, strawberries, raspberries and other fruits.

The trees most abundant at the foot of the hills were oaks, holly, chestnut, hornbeam, laurels, birches; higher up, pines (Pinus longifolia, &c.), and deodars (Pinus deodar). The forests of rhododendrons (Rhododendron arboreum) were particularly beautiful: white varieties, found by Dr. Wallich on Sheopur, in Nepaul, at an elevation of 10,000

feet, were met with by Captain Johnson at the pass of Laptok. Silver fir, hazel, jasmine, and gum cistus are also mentioned in the narrative. Some tracts were covered by a yellow-flowering composite plant like camomile; willow shrubs, observed by our traveller—according to Turner, grew on the banks of the Tchintchia and with the pepul tree (Ficus Indica) around the village of Bhootan. Roses were occasionally met with. Saunders (Phil. Trans. vol. lxxix.) mentions Rosa Alpina, R. centifolia, R. canina, R. Indica, and R. spinossisima, as growing among the hills to the east. Dr. Gerard mentions three species of rhododendron, one flourishing at a height of from 6000 to 10,000 feet, bearing a large red flower; the second from 11,000 to 12,000 feet, with a delicate pink blossom; the third species attains to 14,000 feet, but in the guise of a shrub.

The grains used in these hills are barley and wheat, red and yellow bhattoo (Amaranthus anardhana), cheenah (Panicum miliaceum), and khoda (Paspalum scrobiculatum). The ooa (Hordeum celeste) and phapur (Panicum Tartaricum) flourish at an elevation of upwards of 13,000 feet. It is quite erroneous to say that grapes will not grow on the Hindoostanee side of the range of the Himma-leh (Major Archer's Tour in India); greensward and plots of graminæ begin to make their appearance immediately at the foot of the hills.

Corn is said, at the southern side, not to be cultivated at an elevation exceeding 10,000 feet. Gerard mentions poor and scanty corn at 13,600. There were fields of rye and buckwheat at the temple of Mileum, according to Captain Webb, at an elevation of 11,408 feet. The spikenard was found by the same observer at 13,000 feet. Strawberries and currant bushes in blossom, June 21st, 11,680; buttercups and dandelions 12,642; a campanula was gathered in seed by Gerard, at Shetool pass, at an elevation 16,800 feet. Captain Johnson found furze and greensward at 14,600. Hills of 5000 feet were clothed to the top with wood. At Bhootan, turf or peat bog 7898 feet. Pass of Seeti, polyanthus at 11,000 feet. Apple trees above Kanum 8998 feet. The punjeol was cultivated to a height of 13,700 feet; above was greensward and furze to 14,600 feet. Horse chestnut and poplar trees grew at Rhogee at an elevation of 9096 feet. According to Captain Burnes, the whole range of the Hindoo Coosh is entirely destitute of wood—presenting a striking contrast in that respect to the Himma-leh.

Physical Geography.—The dripping-rock of Sansadarrah, described by Captain Johnson, resembles what is presented to us in limestone formations in our own country, and sometimes in sandstone rock, when one of the chief beauties—the pendent stalactites—are absent. The spring of Sansadarrah is perhaps upon a larger scale, and surrounded by more magnificent scenery than any similar springs that have been described. The dripping-rock of Knaresborough is an example of these springs in our own country. There is a small one at Roslin, near Edinburgh, which is instructive in pointing out that vegetation of Marchantiæ, Jungermanniæ, &c., which grows in dif-

ferent degrees of humidity from continued streams to drops, or a mere mist or humid atmosphere. It has often struck us, that artificial grottoes with stalactites might be made in limestone districts, by dividing a rivulet or the branch of a rivulet over misshapen or irregular masses of rock and stones, piled together like a dome-shaped edifice. Much value is attached to the introduction of a Lobelia; why might not mineralogy be brought to further the improvement of landscape and ornamental gardening?

Captain Johnson describes the waters of the Jumna as of a deep and almost inky-bue colour. This was at a distance of not much more than thirty miles from its sources; and snow was lying in patches on the hills around. This is of importance, because observations on the colour of waters, where they may be supposed to be in their purest state, where they flow from mountains covered with perpetual snow, and where the earth is destitute of vegetation and of alluvial soil, are much wanted. "Nothing," says De Humboldt, "proves that waters are white;" and in situations such as we allude to, naturalists are most inclined to think that the colour of water is blue or green. A late eminent chemist was inclined to look upon the tints of the sea as owing to the presence of iodine. If rivers contain a colouring principle, it is so little in quantity, that it eludes all chemical research. It has been further remarked, that the tints of reflected light, the colour of which comes to us always from the interior strata of the fluid, and not from the upper stratum, are generally very different from the tints of transmitted light; particularly when this transmission takes place through a great portion of fluid, which would be the case in very pure waters. The variety presented in the coloration of rivers is very great; we have merely ventured to point out the bearing of our traveller's observation to one order of considerations. De Humboldt asks if the Aquas negras of South America may not be coloured by a carburet of hydrogen; which will remind the reader of Doctor Macculloch's ingenious comparison of the extractive vegetable matter which becomes soluble, in the transformation of plants into peat, to the torrefaction or roasting of coffee.

A spring is described as containing sulphuretted hydrogen, and depositing sulphur, even in the bottom and deep waters of the well. Humboldt supposed, in an instance of this kind (springs of Bergantine in Cumana), that the atmospheric air in the water was decomposed by the sulphuretted hydrogen, nitrogen being delivered. The researches of Professor Daubeny on the thermal waters of Bath led him to believe that the large proportions of nitrogen evolved in those springs is not derived from the atmospheric air.

The heat which the hydrosulphurous springs of the New World acquire in the interior of the globe were found to diminish in proportion as they passed from primitive to superposed formation. This is in consonance with what is now known of the progressive refrigeration of the earth's crust. Native sulphur has also been found depositing itself in crevices in crystalline primary rocks, the temperature

of which was higher than the mean temperature of the surrounding atmosphere. There is nothing, then, in this abundant evolution of nitrogen that militates against the opinions entertained on its generation by the first-mentioned philosopher.

Thermal springs abound so much in the Himma-leh mountains, that our traveller says that they were of almost daily occurrence. The celebrated springs of Jumnotree depositing oxide of iron, and issuing from caverns of snow, have, according to Hodgson, a temperature of 194° Fahrenheit; which, considering the elevation, 10,849 feet, is nearly the boiling point of water:—they issue from granite. Nor far from the same spot, Captain Johnson mentions the occurrence of a spring that would boil rice. The occurrence of these thermal waters in crystalline rocks is a fact of much geological importance, more especially when we thus find them distributed through mountain chains, which appear to bear upon their elevated acclivities sedimentary formations of little antiquity, and which appear in modern times to be still the focus of subterranean movements, and of derangements in the earth's crust. Captain Hodgson experienced slight movements in the earth at his visit to Gangootri; our traveller notices the destruction of the Fort of Djenné by an earthquake in 1803; and Captain Burnes felt violent shocks at Lahore in February, 1832. How modern may be the elevation of water-worn rocks accurately described by Captain Johnson, as occurring on the acclivities of the mountains between Nako and Chango, on the Speeti, and which appearances extend over a large tract of country? Everything, indeed, would lead us to believe that changes have taken place in the configuration of the soil in the neighbourhood of the Himma-leh at comparatively a late period. The Brahmins assert, to the present day, that Cashmere was but lately covered with water, forming, as it were, a lake. Bernier, a Frenchman, who is said to have travelled in Cashmere in the reign of Aurengzebe, first collected facts in evidence of this tradition (Description de l'Inde, par Anquétil du Perron. Berlin, 1787). Professor Ehrenberg has ascertained the existence of the royal Bengal tiger in the steppes of the Kirghese and of the high Irtyche, in the present day; and this fact, De Humboldt has ably pointed out, connects itself with the discovery of the bones of elephants at the mouth of the Lena and at Escholtz Bay, in evidencing a gradual change of temperature and the little antiquity of the last revolutions of the soil in Asia. The researches which these able travellers have lately been carrying on, of the relation between the volcanic phenomena of central Asia and the striking geognostic traditions of the Chinese, with the great lowering of the soil around the Caspian Sea and the epochs of the upraising of the different mountain-chains of Asia, attach themselves to considerations of this kind.

The *cataract* which Captain Johnson observed at the head of the glen near the sources of the Pabur equals in interest any falls with which geographers are acquainted. The Ruikan Foss, the highest cascade known, is composed of three falls, one of which is 800 feet high. Our traveller estimates the two falls of the Pabur at 1500

feet; the Chute de Gavarnie, the loftiest single fall, is 1160 feet. The dispersion of the water before it reaches the ground has already been made known from observations made in Mexico; and a still more curious phenomenon is recorded of the river Malkan, at the foot of Elburus, where no current of water is said to be perceived, but the sheet is separated, and drops in isolated masses.

"The *snow-beds* of the Himma-leh," says Captain Johnson, "are the glaciers of European Alps." That is to say, the constitution of the great masses of snow that lie in the glens, at the head of the valleys and the acclivities of mountain-groups, are not accumulations of loose snow, but melted and frozen again, sometimes nearly compact and massive, at other times porous and even cavernous; and where, as Ramond has remarked in the Pyrenees, in a vertical section, the hot summers may be distinguished by the thin and transparent bands, and the mild summers by the porous ice, and these again differ from the ice and snow of winter.

Our traveller further remarks upon the absence of snow from the loftiest and most perpendicular peaks of the Himma-leh range. It had been already observed by Von Buch, (Travels in Norway, p. 153,) that to produce glaciers it is not enough that mountains enter the region of perpetual snows, they must be preserved there by means of a considerable space, for an insulated high mountain and a small chain of mountains can never collect so much ice in one place as is necessary to drive forth a glacier from the upper regions to warm valleys. The glaciers or snow-beds on the acclivities of mountains resemble icicles that melt at their extremity, but the snow-beds of the heads of valleys impel new masses of ice downwards;—the rate of whose progress, Saussure has remarked, may be measured by the march of the *moraines*.

The limits of congelation in the Himma-leh mountains were placed by a writer in the Quarterly Review as low as 11,000 feet. This would be very little above the lowest height at which snow falls in the same latitudes, which De Humboldt (Personal Narr., vol. i. p. 129) places in 20° N. lat. at 3020 metres. Captain Webb estimated the line of eternal snows at 13,500 feet: Frazer at from 15,000 to 16,000 feet. Captain Hodgson found the Bagiruttee, on the 31st of May, issuing from a snow bed. About the same time of the year, Captain Hodgson, and on the 12th of May, 1827, Captain Johnson, visited the sources of the Jumna, also issuing from Captain of snow, at an elevation of 10,840 feet; and in November, Captain Webb found the Gauri bursting from the snow at an elevation of 11,543 feet; but these were all snow-beds or glaciers pushed on by the inexhaustible stores of the mountains. It was a pretty idea of Hodgson, that the hot springs of Gangoutree and of Jumnotree were there to provide water in winter, by the melting of the snow around. The notion is, however, more amusing than philosophical. According to theory, the height of the snow-line between latitudes 27° and 35° would be 11,400 feet. The facts which oppose themselves most to this deduced elevation are the observations of Webb, Gerard, &c., on

SKETCH

OF PART OF THE

HIMMA-LEH MOUNTAINS,

to illustrate the Paper by

CAP^T. JOHNSON.

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the altitude at which habitable spots and even villages are met with, and on the physical aspect of these elevated regions. Thus the first of these observers found the Sutlej flowing in a plain 14,924 feet above the sea, and surrounded by fine pasture land. The facts which have been noticed in the distribution of vegetable forms, while they also militate against the low descent of constant snows, assist in giving some idea of the diversity of climate which is presented by these mountains. In multiplying observations on this subject, it would be of importance to distinguish between observations made at the head of transverse valleys and those made on the acclivities of mountains, or on highly inclined planes or isolated peaks and ridges, as well as in the plains. These circumstances—the configuration of the soil, like the direction of chains of mountains, and the diaphanous character of the air (Humboldt), which at once increases the radiation of the plains, and the power of transmission of the radiated heat—the conducting power of the rock or soil—the clear exposure or unshadowed aspect of the surface, or the circular arrangement of glens with mural precipices, influence the temperature both of the soil and air of the station, and lead, from their neglect, to erroneous deductions in the inferior limit of the snow-line. Jacquemont had already attributed the inequality in the height of the snow-line on the two sides of the Himma-leh to the serenity of the climate of the plains of Ladauk, and the foggy climate that reigns in the Hindoostan side, De Humboldt, in his extended views of the climate of Asia, (Fragmens de Géologie et de Climatologie Asiatiques, tom. ii.) has participated in these ideas. The character of an *excessive* climate, he thinks, is shown in this peculiarity in the lower limit of the snow-line: that even in the Caucasus it is 250 to 300 toises higher than in the same latitude in the Pyrenees. This accurate physical geographer gives for the limit of snows in the Himma-leh, lat. 30¾° 31°, for the southern slope 1950 toises, and the northern slope 2600 toises. "This great elevation of the limit of perpetual snow," he remarks, "between the chains of the Himma-leh and of the Kuenlun, between the 31° and 36° of latitude, and perhaps towards the north-east, in still more elevated latitudes, is a kind provision of nature. By offering a more extensive field for the development of organic forms for pastoral life and agriculture, this elevation of the zone of snow and this radiating power of the Thibetian plains render inhabitable in Asia, to people of a mystic and sombre physiognomy, of a religious and industrious civilization,—an Alpine zone, that, in the equinoxial regions of America, in a more southerly latitude, would be buried under the snow, or exposed to cold winds which would entail the destruction of all cultivation."

V.—*Hints on the Subject of Geographical Arrangement and Nomenclature.*—Communicated by Colonel Jackson, F.R.G.S. (St. Petersburgh). Read 24th March, 1834.

Actuated by an ardent desire for the advancement of geographical science, and unable, from the stationary situation I now hold, to contribute to its progress by anything new in the way of travels, I shall venture to draw the attention of the Royal Geographical Society to a subject which I have ever regarded as of considerable importance;—I mean the systematic arrangement of the objects of the science, the establishment of a precise and comprehensive nomenclature, and the further improvement of maps.

No period certainly was ever so favourable for such an undertaking as the present. Geography, long considered puerile, has at length received from philosophers the degree of attention it so justly merits; and from the societies now formed for the special purpose of its progress, civilized nations expect that guidance which shall lead by the shortest and surest road to a perfect knowledge of the globe; and not only do they expect guidance, but they are willing to be led, provided due regard be paid to such customs as, from long continuance, have settled into habits not easily overcome.

Hence the establishment of a definite order and nomenclature can meet with no other obstacle than that which arises from the difficulty of amalgamating the new wants of the science with its old habits,—a difficulty certainly great, but by no means insurmountable. To this object, therefore, I would invite the attention of my learned colleagues, convinced that when they shall have produced a system, it would, at their recommendation, be readily adopted by travellers, whose works, now universally read, would soon render it popular.

By a system, I mean only such a methodized arrangement of facts and objects already known as shall serve to render our acquaintance with them more complete, our notions more precise. Unfortunately no science, perhaps, presents greater difficulties to an exact classification than geography, for in no one are the objects which compose it so naturally indefinite in their limits. A natural order, on the one hand, seems almost impossible, while, on the other, it is difficult in many cases to seize upon such characteristics as shall determine our choice in an artificial arrangement; and when to this disadvantage we add the inveterate tenacity with which men in general cling to long-established usage, it will appear evident that nothing short of the maturest deliberation, and the united judgment of many, can accomplish the arrangement of a method likely to be adopted.

Thus, though I would strongly urge the necessity of the undertaking, I shall by no means disguise its difficulties. On the contrary, I think, they cannot be too prominently set forth at once, in order that those who enter upon the task may come to it fully prepared to struggle against all obstacles, and hence be the more certain of success.

In order to explain the nature of the difficulties to which I allude, I shall instance the case of *rivers;* an object taken at random, and the first that presents itself to my mind.

A large stream, if traced upwards from its mouth along its several affluent rivers to the smallest streamlets which bring their little gurgling tribute, bears considerable resemblance to a tree. The several bifurcations and canals which form the deltas of many rivers may be compared to the roots, from which, as we proceed, springs the trunk, and from this the larger branches, which in turn ramify into subordinate branches and sprigs, and finally into what may be likened to fibres or terminal tendrils.

If we except the root-like appearance produced by deltas, which do not always exist, it will be found that large and small rivers have precisely the same kind of distribution, and only differ in the size, number, and direction of their parts. The small are miniatures of the large, both bearing to each other the same relation which a young tree does to a full-grown one. The trunk of the former may be smaller in all its dimensions than even a subordinate or secondary branch of the latter, but the young tree is nevertheless perfect in all its parts. It is, therefore, the position and direction of the parts which constitute them trunk or branch, and not their absolute dimensions. The same reasoning holds good of rivers; so that, if each part had a specific name, these names would apply alike to streams of very different dimensions. So far, however, from each kind of ramification, either of trees or rivers, having a name, we have in English, as applied to the former, but the two divisions of trunk and branch, and for the latter also two, those of river and brook*.

The French have threo distinct terms, but they are too vaguely defined to be of much use. Thus with them the *Fleuve* is defined *une grande rivière, qui se rend sous le même nom de sa source à la mer;* the *Rivière, une eau qui coule dans un lit assez profond pour porter bateau, et qui se jette dans un fleuve;* the *Ruisseau* is *un petit courant d'eau.*

A very litle observation will suffice to show the inadequacy of these definitions. Almost all the streams which, taking their rise

* We have *rivulet* and *streamlet*, but they are synonymous with *brook*, being but diminutives, the former of the general term *river*, and the latter of the still more generic appellation *stream*, applicable alike to all running waters.

on the western slope of the Andes, fall directly into the Pacific, have the same name from their source to the sea, as well as, or even more generally than, the great streams which, flowing from the opposite side of the same mountains, discharge themselves into the Atlantic. To apply therefore the same definition and the same name to objects so different, seems as absurd as it would be to call a mountain a mole-hill. I know it may be urged that I have only taken a part of the definition which says *une grande rivière*, &c.; but what is the size, I would ask, which establishes the distinction between *fleuve* and *rivière?* and if dimensions are to decide the question, what is to be regarded—the length of course, the breadth, the depth, or all of these together, or the quantity of water furnished?

Nor is the term *rivière* more satisfactorily settled. It is a stream flowing in a channel or bed (*lit*), sufficiently large and deep to admit of boat navigation. But what will do for one species of boat will not do for another, and as the kind of boat is not mentioned, nothing is defined. Moreover, the *rivière* empties itself into the *fleuve:* what, then, are those streams which, being large, ay, and very large, and navigable for the largest boats, flow, not into a *fleuve* but into another *rivière*—as for instance, the Wabash, which falls into the Ohio, itself a *rivière* and not a *fleuve*, according to the definition, as it does not fall directly into the sea, but into a *fleuve*, the Mississippi? The Wabash cannot be called a *ruisseau*, it is to all intents and purposes a *rivière*, but a *rivière* must fall into a *fleuve:* what then becomes of the definition?

The line of distinction between *rivière* and *ruisseau* is not better defined; for a small *rivière* is often a large *ruisseau*, and *vice versa*. The French, then, with their three orders of streams, are just as much confused as ourselves with our *rivers* and *brooks*.

The present arrangement therefore is evidently insufficient, and the establishing of a new one is by no means an easy task, as we shall soon see.

The first step towards the formation of a nomenclature is a classification of the objects to be named, after which such names must be assigned to these several objects as shall best specify them. With regard to streams, then, two things may be considered;—1st. their arrangement as independent hydrographical systems, each being regarded as a distinct individual belonging to, and enclosed within, a general basin, unconnected (unless by accident, design, or some rare exception) with any other basin; and 2nd, the arrangement of the several parts of which a system is composed.

With regard to the first of these objects it may be observed that, with the exception of such streams as empty themselves into lakes and swamps having no apparent issue, or of such as lose

themselves in subterraneous passages so as to be no further traced by any subsequent exit, all the waters which flow on the surface of the earth disembogue themselves into the sea: some simply and directly, others by means of channels not their own, with which they communicate mediately or immediately.

Now such is the irregularity of the earth's surface, that a stream communicating *singly* and directly with the sea, can in general have but a very limited course; for if the course be long, it is sure to be met by other courses; and if very long, these courses which it meets will, in their turn, be long and be met by others, and so on to four, five, and perhaps in some cases to six successively,—all the streams so connected forming collectively a system.

The question now is, shall we range all the individual systems into one general order, whatever may be their length or the number of their ramifications, and consequently assign to them but one generic name, in which case they would be distinguished from each other only by the proper name of the principal-stream of each? or shall we arrange them into a number of classes according as they are composed of one, two, three, &c. orders of ramifications? for if we would class the systems at all, I see but this alternative. By the first of these methods each individual system would indeed be indicated, but nothing of its nature would be specified; by the second we should be a little better informed, though by no means adequately. Previous, however, to explaining the difficulties of this latter arrangement, I will endeavour to show the still greater difficulty of founding a classification of rivers on any other consideration than that of the several orders of ramification they exhibit.

Were we to attempt a classification founded upon the length of the principal recipients of each system, we should soon find that, from the gigantic Mississippi, whose course is, I believe, about three thousand seven hundred miles, down to the Thames, whose length is about two hundred and fifty, and from this down to the shortest, although the extremes are widely different, the intermediate terms descend in so gradual a ratio as to preclude the possibility of any thing like a natural division.

If we should seek a principle of classification in the medium breadth and depth of the main streams of the several systems, or their width at the mouth, or the *number* of affluent streams, or even the superficial extent of the basins of each system, or the quantity of water they furnish, we should in like manner find that not only under each of these arrangements the rivers would be differently placed, but the progression in each list would still be so gradual as to baffle all attempts at a distribution into orders or classes founded on such data. Nay, what is still more, if the

several partial lists so formed were to be concocted into one, by the addition into one of all the smaller numbers together and successively of the larger, still the same kind of regular gradation would appear, presenting no defined limits for a classification.

Let us therefore now return to the idea of a classification founded on the *orders of ramification.* This method appears to me the least objectionable, though it is by no means exempt from considerable defects.

By *ramification,* figuratively speaking, I understand generally the confluence of the streams, the one being regarded as recipient of the other; and by *order of ramification,* I refer to the order of the recipient, as being primary, secondary, &c., reckoned from the sea. Thus I say, a river falling directly into the sea is the primary recipient of the system to which it belongs, and all rivers falling immediately into this recipient form ramifications of the first order, whatever may be their number.

Thus, in *plate* 1, containing figures of the same hydrographic system differently arranged, and wherein each distinct stream is indicated by a different colour, *fig.* 1 represents a system having but *one order* of ramifications; A A *red,* being the primary stream, into which all the rivers, *aa* blue, fall immediately. In *fig.* 2, A A *blue,* being the primary stream, receives the red, which in its turn receives the yellow: here then are two orders of ramifications; and so on, as shown by the figures 3, 4, and 5, the last of which has five orders of ramifications.

Now an inspection of the most detailed maps will show not only that the largest rivers, generally speaking, are those which have the most orders of ramification, but that the very largest have not more than five orders. The number of each order may be very great, and thus a system with but two orders of ramification may be very extensive, and stretch, with a tree-like appearance, over a vast extent of country; and this, I grant, is a great objection to the method proposed. Yet were it to be adopted notwithstanding this defect, then all hydrographic systems comprising five orders and upwards would form the first class; those of four orders, the second; those of three, the third; and so on.

But a greater disadvantage still than the one already mentioned might be apprehended from an inspection of the plate; viz., that the same identical system may be arranged as one of the first, second, &c. class, according as we determine it to be composed of different orders of streams. Thus, if the system here represented be supposed newly discovered, and neither as a whole nor as regards any of its parts to have received any name, it may be asked,—what is now to guide us in our choice of an arrangement? Shall we say, as in fig. 1, A A *red* is a great trunk or river of the

first order, receiving five other streams of the second order; or shall we determine, as in fig. 5, A A *blue* is a river of the first order, receiving one of the second order, which in its turn receives one of the third order, into which falls one of the fourth, and so on; or shall we adopt any of the intermediate arrangements? If we determine that the longest course shall decide the question, which is to be the trunk?—it may be disputed; A A *red, fig.* 1, being of the same length as A A *blue, fig.* 2, or A *a blue* and *red, fig.* 5. If we take the straightness of direction, the line *xy* of general direction is as straight, for A A *red, fig.* 1, as for A A *blue, fig.* 2. If we take the mass of water, it is evident that the stream below the confluence of any two streams is composed of those two; so that we see no reason why it should bear the name of the one any more than the other, particularly if the two of which it is formed furnish masses of water nearly equal, as is frequently the case. Neither the breadth nor depth can be well chosen to decide the point, as they are so variable in different parts of the same stream.

These difficulties would certainly be almost insurmountable if we had yet to decide on affluents and recipients; fortunately, most rivers are not only named, but in most cases it is already determined which are the recipients and affluents of each other. This determination, though extremely arbitrary, cannot now be changed, nor would it be advisable to change it; for in an artificial classification (the only one possible) it may be regarded as so much done, and by its means the class of any river, as depending upon the different orders of ramifications, may be settled.

For such rivers, however, as are not yet determined—and there are many in South America, where the greatest confusion reigns on this subject—it is advisable to follow some rule as a motive of determining which of two rivers shall be regarded as the recipient of the other.

From what has been already said, it will be evident that the arrangement and classification of rivers in general is by no means an easy task, nor is it less difficult to determine on the relative rank of the different parts of any individual system. It follows, of course, that if these objects cannot be classed, they cannot be specifically named. And yet I think it essential to clearness that the same word *river* be not applied alike to such immense water-courses as the Mississippi, the Marañon, &c., and the Thames or the Humber; and also that affluents be distinguished from their recipients by some specific appellative.

It will probably have been observed that I have constantly made use of the word *affluent* where in general the word *confluent* is employed. I have done so designedly, being desirous of the introduction of the word *affluent* into the language as a substantive.

The term confluent is generally used as applicable to a stream

which empties itself into another. This is quite incorrect, and I would recommend the adoption of *affluent* instead. This word, an adjective with us, has become a substantive in French, and is universally used to denote a tributary stream. *Confluere* means to flow with, and cannot therefore with propriety be applied to a stream *before* its junction with another. *Affluere* means to flow towards, and is therefore, in my opinion, a much better word as applied to a tributary stream. I would make a still further distinction, calling generally by the name of *tributary* any stream which directly or indirectly contributes its waters to the main trunk; reserving the term *affluent* for such only as flow immediately into another river mentioned. Thus I regard both the Wabash and the Ohio as *tributaries* of the Mississippi, but the Wabash is not an *affluent* of the Mississippi. The Ohio is an affluent of the Mississippi, and the Wabash an affluent of the Ohio. I do not mean, however, to banish altogether the word *confluent*, but I would confine its application to a stream formed of two others, neither of whose names it bears. Thus the Thames is a confluent of the Thame and Isis; the Kerah, or Guna, a confluent of the Beyah and Sutlej, &c.

We frequently talk of a stream as being the *arm* of a river. I would strongly recommend, if we *must* use metaphorical language, the choosing, once for all, the most appropriate metaphor, and then abiding by the same. I shall have occasion hereafter to allude more particularly to this topic; at present I would say, that a tree bearing, of all things, the greatest similitude to a river, when we consider this on a map, with all its tributary streams, we should use only such terms as have relation to this similitude. Thus, I would talk of the *branches* of a river, not of its *arms*. We sometimes also say the *head* of a river; and though we say, a *body* of water, I have not yet heard of its *legs*; yet, if this language were adopted, the *deltoid branches* should be called the *legs*.

I know that a tree is in one respect the very reverse of a river. In the former the fluid flows from the bottom towards the top, or, more strictly speaking, both up and down; whereas, in a river, it is the very reverse, if we regard the mouth as the lower extremity. This objection might, however, be obviated by regarding the sources and little fillets of water, which give rise to rivers, as the roots of this aquatic tree. Indeed, this way of considering the subject has many advantages. In the first place, the direction of the current is more strictly analogous; and in the next, we are in the habit of considering our backs as turned to the source when we talk of right or left. Nor are there wanting vegetables, particularly among the climbers, in which the thickness increases as the distance from the roots is greater.

All this may be regarded as puerile, but I must persist in my opinion, that precision and appositeness in nomenclature are of more importance than is generally allowed. There will ever remain a contradiction of ideas in the employment of certain expressions. Thus we say to *ascend* the stream, which, in going towards its source, is proceeding towards the roots, while in a tree it is the reverse. Indeed, I hardly see any remedy for all this, unless by the framing of an entirely new nomenclature, which would not only be difficult in itself, but difficultly adopted. All that can be done is to reject what is bad, supplying its place, when we may, by terms more fit and likely to be accepted; and to find new names for those objects only which have as yet received none sufficiently specific. Something, I think, might be done, in regard to the branches of rivers and the islands they sometimes form, so as to convey more correct ideas of them than we can possibly have at present.

Of river islands I would establish two divisions, which I would term *branch-islands* and *channel-islands*. By the first I understand such as are formed by the anastomosing of the branches of a river. Most rivers present some of this kind in the lower part of their course, or where they flow through low and marshy ground. All deltas present a greater or less number of these, which, as a further specification, I would denominate *deltoid islands* (see fig. 2, pl. 3).

Thus, such branches of a river as after separation re-unite, I would term *anastomosing-branches;* or, if a word might be coined, *ana-branches*, and the islands they form, *branch-islands*. Thus, if we should say, " the river in this part of its course divides into several *ana-branches*," we should immediately understand the subsequent re-union of the branches to the main trunk, and be informed thereby of the existence of branch-islands and of a low and, in most cases, marshy soil. If we said, " the river in such a part formed a number of *branch-islands*," the same kind of knowledge would be imparted; that is, we should thereby understand the river to throw off branches which subsequently re-unite, as is generally the case in low ground.

The branches which I term *deltoid-branches* are evidently of two kinds. The outer branches I would term *deltoid-branches*—they are those which enclose the whole delta. From these there frequently branch off others, without anastomosing, forming merely smaller deltas within the larger one: such I would call *deltoidal-branches;* and when there is anastomosis, I would call them *anadel-branches*, being an abbreviation of *anastomosing-deltoidal-branches*. I cannot but think, that names founded on this principle would greatly contribute to clearness in description.

By *channel-islands* I understand those not formed by any branching off of the river, but such as exist in its channel. Such islands are sometimes primitive; that is, they are composed of the same soil as that of the opposite banks, of which they are a continuation, or of a soil still more compact; and sometimes they are of secondary, or, more properly perhaps, of posterior formation, and composed of such sand or detritus as the river has brought down and deposited. In order, therefore, to distinguish them, I would call the first *bed-islands,* and the others *bank-islands,* if generally above the surface; reserving the name of *banks* for such as are generally covered or liable to shift, which those habitually above the water are not.

Thus, if, in describing a river, we should say, " its navigation is obstructed by a number of *bed-islands,*" we immediately perceive more or less difficulty in rendering it navigable. If we speak of obstruction from *bank-islands,* we may infer a greater possibility of removing the obstructions. At present, the term island having no definite idea, leaves our conceptions vague, so that we cannot have a perfect knowledge in any particular case but by means of much tiresome circumlocution.

Such a system of denomination furnishes us moreover with a variety of accessary knowledge, frequently of considerable interest. Thus, for instance, if we know the nature of the soil through which a river flows, and are told that it has many *bed* or *bank-islands,* we have immediately some idea of the degree of rapidity of the current; for if the bed-islands are of the same nature with the soil, and this be sandy, gravelly, or of loose earth, it is clear the river must have, and must for a long time have had, but very little velocity. *Bank-islands* will, in almost all cases, be indicative of a powerless current. If, having spoken of great rapidity and strength of current, we find the river to be, notwithstanding this, full of *bed-islands,* we immediately infer their compact nature; and if, in such cases, which however is unlikely, there should be *bank-islands,* they can only be formed of large stones, and are an indication of a diminished velocity of the stream, since it once brought down what it has no longer power to move.

The words *bed* and *channel* are frequently employed as synonymous terms when applied to rivers. There is, however, a difference, which will be rendered sensible by a little attention. By the channel I understand generally the course, and more particularly the deepest part of the course, of a stream; that which by the French is termed *chenal,* and by the Germans *thalweg,* or *talweg,* as the French write it. In the general sense, we say the channel is wide, long, meandering, straight, &c.; in a particular sense, we say it is deep, obstructed, and so forth.

The word *bed* would in these cases be improper. By this latter

term I understand, as applied to a stream, that part of the channel over which the water generally flows, and that part of the basin of a sea or lake on which the water reposes. The bed of a river is of mud, sand, &c.; even or uneven, and so forth. When we say the *bed* is deep or shallow, we speak generally of the whole breadth of the channel; but if we say the *channel* is deep, we refer to the mid-current, or that part immediately below what the French call the *fil-de-l'eau*. A river does not always change the nature of its bed on changing its channel, and the bed is very different in different parts of the same channel; the terms, therefore, are not synonymous, and precision requires that in the use of them a due attention be paid to their respective meanings. Nay, further still, I should like to see the general and particular course of a stream precisely indicated by the settled signification of the terms *straight, serpentine, meandering, winding*, and some compounds of these. Thus a river may be straight in its general direction, but serpentine in detail; and thus, were I to speak of the direction of the Bermejo or Vermejo (Rio Grande), as laid down by Dercalzi*, I would call it *straight-serpentine.* I would say the same of the Magdalena. The Nile is *meandro-serpentine;* the Oronoco *winding.* Most rivers are simply *meandering*, if considered generally, and partake in different parts of some one or more of the different characters mentioned, and which might be specified in speaking of those parts. The fugitive and irregular forms of clouds have been classed, and the classification adopted: why not do as much for the general and particular course of rivers?

We talk also very vaguely of the *banks*, the *borders*, the *margin*, and the *brink* of a river. For picturesque descriptions it may be an advantage to have many words whose meaning is nearly the same. Verbal tautology is thereby avoided, to the benefit of style; but in a scientific point of view it is otherwise: here, if each of these terms be retained, its precise signification should be established. At present, the term *bank* means both the immediate edge, or border of the river, and the land for a certain undefined though not considerable distance on either side. Thus we speak of "steep and shallow banks," and "banks adorned with villas." The French have different terms, such as *rivage, rive, bord, berge*:—with them *rivage* is more exclusively applied to the sea, *rive* particularly associated with the word *fleuve*, and *bord* to the word *rivière*. Thus they say, "*Les rivages de la mer, les rives d'un fleuve, et les bords d'une rivière.* *Bord* is, however, sometimes applied to *rivière;* and if *rive* and *rivage* are not associated with *rivière*, it is probably to avoid an inharmonious repetition of sounds so similar. In point of fact, however, *bord* and *rive* imply the same thing, and have precisely the same general

* See Bulletin de la Société de Geog. de Paris, No. 119, Mar. 1833.

and particular meaning as our word *bank*. *Berge* (a German word) has, on the contrary, a different signification; it means those heights now at some distance (greater or less) from the river, but which seem to have been at one time its immediate banks. The Ohio is a remarkable instance of a river having two or three ranges of *berges*, rising above each other, at different distances; the last being in some parts visible at the foot of the most distant hills. We have not, I believe, any term particularly indicative of such banks, and when we would designate them must employ the term *bank* or *border*, with some explicative addition. Would it not, therefore, be advisable to adopt the word *berg* in the singular and *bergs* in the plural (to avoid the harsh sound of *berges*, pronounced as two syllables); to confine the term *banks* (as applied to the lateral limit or edge of a stream) to that part of the soil immediately washed by the stream; to restrict the word *border* to the nature of the vegetation at the water's edge, or to artificial works, as *bordered* with sedge, with forest trees, with quays of granite, &c.; to apply the term *brink* to the water's edge; and *margin* to the space between the *brink* and the *bergs*. I would further designate the margin as sloping (the French use the words *en talus* in this case); or *terplain* (from *terre-plein*), used adjectively or substantively, as occasion might be, if the space were horizontal.

But I will no longer dwell on the subject of rivers; it is perhaps one of the most difficult to class, and as to the names which are, or may be, given to whatever is connected with them, I have already said perhaps too much in explanation of my idea. I shall now revert to the necessity of adhering to one particular metaphor or comparison, when any such is requisite; and the more forcibly to point out this necessity, I will instance the case of mountains.

That the generality of mankind, limited in their conceptions, and considering all objects with reference to themselves, should be seized with awe at the sight of mountains many hundred times higher than the loftiest of their edifices, and that their expressions should partake of that confusion of ideas incident to exaggeration and ignorance, is no way to be wondered at; but that the learned, accustomed to study the universe with enlarged views, should make use of terms and comparisons such as are only befitting the least informed, appears to me a degradation of science and a mental aberration.

Doubtless, the sight of lofty mountains raising their summits above the clouds is well calculated, by comparison, to sink the stature of man into insignificance; but with relation to the globe of which they are a part, so far from being, as they have been termed, the frame-work, the skeleton, the *ossature* of the earth, which binds, strengthens, and sustains it—so far from this, I say, they are (if a parallel must absolutely be employed) but slight irregularities, little pustules on the epidermis of that huge body the world.

It is true that metaphor in general serves to raise the style; nay more, where the comparisons are just and well sustained, they are admirably adapted to rapidity of conception, and are therefore frequently employed with advantage even in scientific writings. But what are we to think of a metaphor, or rather of a confused jumble of metaphors, which pictures to us the mountains of the earth as "*Chains* springing from a *plateau*, as from a *mother-mountain*, and then reuniting by means of *branches* and *ramifications* to *succursal masses*; whence, as from a *central point*, or as from a *new trunk*, spring off a number of other *arms of the skeleton* and other *branches*, pushing their *roots* into Europe, of which they form the *nucleus*; which *nucleus*, in its turn, throws out fresh *twigs*, which form the *spinal-bone* of Italy, &c.!" Yet such is the literal and exact translation of a passage in a French work on physical geography, by a gentleman of title and considerable celebrity (still living, I believe). Nor need we look long before we find similar examples, though perhaps not quite so overcharged, in the works of our own countrymen.

Every one certainly is free to choose the comparisons which appear to him the best fitted for his purpose; but when he has chosen, I would say, let him stick to his tree like an ivy branch. To be serious, let him choose a just comparison and abide by it.

These comparisons, however, would be less necessary if the language of the science were fixed. In what regards the classification of mountains, as to bulk, direction, disposition, continuity, form, height, &c., it is particularly indefinite: plateau, mountain, mount, hill, hillock, highland, chain, group, cluster, mass, range, ridge, basin, valley, vale, defile, pass, passage, ravine, gully, slope, brow, face, pinnacle, needle, summit, point, cone, &c. &c., are all words having no definite or precise meaning.

Mountains have their absolute and particular heights—the former measured from the level of the sea, the latter from the base or bottom of the mountain itself. But what, I would ask, determines the limit of this base?—and when the plains, on different sides of the mountain, are themselves at different heights, as is generally the case, is not the particular height different, as taken from different parts?

As for the specification of particular mountains or ridges, I cannot too highly approve of the method adopted by M. Louis Brugiere, in his *Orographie de l'Europe*. I had myself hit upon the same expedient, about ten years since, with a slight modification, however, as I find by my notes. My idea was to denominate the principal chains by the double name of the basins they divide, and the secondary chains by the name of the streams flowing on their left; and I still think this method in some respects preferable. It is certainly shorter, and would moreover distinguish the primary from the secondary chains.

If from rivers and mountains, basins and valleys, we direct our attention to other objects, we shall soon see how completely insufficient is our present arrangement and nomenclature of every object of the science. Bay, gulf, roadstead, haven, port, harbour; promontory, headland, bluff, cape; peninsula, strait, shore, coast, beach, surge, wave, billow, swell; backwater, counter current, eddy, vortex, whirlpool, breakers; fountain, spring, source; stratum, layer, bed; cavern, cave, grotto, den; blocks, boulders, shingle; float-ice, sheet ice, flake-ice, icebergs, land-ice, sea-ice; forests, woods, wilds, wilderness, desert, steppe; and hundreds of other terms, absolutely call for precise definition. What one traveller calls a *moist air*, another will call *dry*; water regarded as *fresh*, or at most a *little brackish*, by one, is accounted *salt* by another; winds are but relatively strong or weak, till the terms are defined. What is a fog, a haze, a thick atmosphere?—the transparency of the air is relative till its measure be determined, and that in a manner not to depend on the greater or less perfection of the observer's sight. What is a warm and what a cold air? &c. &c.

But I will no longer trespass on the patience of the Society: a word on maps, and I have done.

The French have set us an example on the subject of maps and plans, which I think we cannot do better than follow, after reducing their measures to our own, if it were found impracticable to adopt in this matter their decimal system. Twelve different scales are more than sufficient for every possible purpose of geography and topography; and the scales the French have adopted are certainly excellent. They have even gone farther, having determined, with the greatest precision, the length, thickness, and distance asunder of the lines by which elevations are represented in topographical maps, according to their respective scales. The heights of the letters and kind of writing is also fixed according to the nature of the object named and the scale of the plan. Nothing certainly can have been more carefully done; and the rules observed, in regard to maps and plans, at the *Depôt de la Guèrre*, cannot, in my humble opinion, be too highly extolled, too strongly recommended, or too universally promulgated by the Society.

Every geographical map, however small a portion of the world be represented by it, should bear the precise indication of the scale, and state from what meridian the degrees of longitude are reckoned. The want of attention to this latter object, but too common in many maps, is frequently most inconvenient. Another object, which I cannot but think very desirable, if it could be accomplished, would be the printing of streams of every kind in lines of a bright blue, instead of black; as also to cover all lakes with a flat tint of the same colour; and to etch all marshes and swamps in blue horizontal lines, as they are now done in black:

the sea should also be wholly covered with a tint of pale blue, or have a broad blue shading round the coast.

It has been proposed to turn to a useful purpose the double lines of the lower course of rivers by making those double lines commence where the river begins to be navigable. This might certainly be done in some cases, but as a general principle it is impossible, the scale of many maps not admitting of double lines at all. I would therefore propose, instead of this, a zigzag bar across the stream at the points where it begins to be navigable for different kinds of embarkation; indicated by a letter and number thus B, for small boats or canoes; B 2 for barges or large boats drawing two feet of water (changing the number as may be required); V 6 sailing vessels drawing six feet of water, &c. These marks should be placed in all maps of a certain scale, as also another for the highest point at which the tide is felt; such, for instance, as a double arrow in this form, placed in the middle or on one side of the stream. I would also have the same tide-mark at the mouths of rivers and along the coast with a double number thus 20 6, indicating the highest and ordinary tides. Another improvement in our maps which I would likewise recommend, is to denote, by means of arrows and other marks at the confluence and bifurcations of rivers, which are the affluents and which are the recipients. As it is, we have frequently much difficulty in tracing rivers to their source, or from their source to their recipients.

Let any one, for instance, take a map of India, and determine, from inspection, whether it is the Hydaspes, the Ascesines, or the Hydraotes which falls into the Indus; and which of these three rivers is the recipient to the other two. Let him, in like manner, determine whether, after the junction of the Hyphasis and the Hesudrus, the river continues to bear the name of one of these, or takes another quite different from either;—whether, after the bifurcation of what I would call the *ana-branches*, one or both of them continue to bear the name of the stream thus divided, or any other; and finally, after the junction, what name the stream receives? The mere inspection of the map will hardly answer these questions. The trifling addition of a few arrows and marks will, however, make all clear. Thus I would place an arrow along the recipient stream opposite its tributary, reaching both above and below the confluence. For

instance, in tracing up the river which flows by Moultan, the arrow shows me whence it comes. I continue to follow it up and I come to another confluence, where another arrow directs me on till I come to the name, and thus I find it to be the Chenab or Ascesines that flows past Moultan, and empties itself into the Indus. But for these arrows, I might suppose the Chenab to be an affluent of the Ravee, and that it was this latter river which flowed past Moultan on its way to the Indus.*

When two confluent rivers lose their names, so that neither is recipient to the other, I would place two arrows, as where the Begah and Sutlej unite to form the Kerah or Guna, and when, after the bifurcation of this latter, the two *ana-branches* (one of which re-assumes the name of Begah) re-unite to form one which again takes the name of Sutlej. A bar across both banks will here denote the loss of name. If, after a bifurcation, one of the branches retain the name of the divided stream, I would place an arrow along the stream which retains its name, and cut off by a bar the other branch. When both branches retain the name, I would place an arrow in the angle. It were needless to place the arrow where one of the streams being indicated by a double line, and the other by a single one, sufficiently denotes which is the recipient.

These arrows and marks need not be large, but should be distinct; they would not surcharge a map so much as inserting the name of a river in several parts of its course, as is often done, and as is not always sufficient; for although the name be written both on the upper and lower part of a river, the intermediate space may receive other names.

But of all things connected with maps, nothing is of greater importance than the orthography of the names of places and objects; and unless the principle on which we are to proceed in this matter be definitely arranged, we cannot possibly understand each other. Not only, therefore, should a principle be laid down for the future, but it is much to be desired that some one would undertake a book of synonymes, in which, under the most advantageous arrangement, would be found all the names, ancient and modern, by which any place or geographical object may be known. Nothing, certainly, can be of greater advantage to our further progress in any science than the knowledge of what is already done, and too much encouragement, I think, cannot be given to Mr. Babbage's plan of a work on the '*Constants of Nature and Art*. A great variety of geographical data exist, and if they were collected would be of incalculable benefit to our future researches, by preventing the loss of much valuable time in again doing, from ignorance, what has already been performed.

* I here allude to these rivers as laid down by Rennell.

But although much is done, it is in reality nothing compared with what yet remains to be accomplished. When we reflect on the great variety of objects which constitute a knowledge of the earth and of its atmosphere, we see a vast field as yet but little explored. How much is yet to be known on the subject of winds, atmospheric pressure, temperature of the air in different regions, at different heights, and under different circumstances of season, &c.;—hygrometry, magnetism, electricity, local anomalies, changes of climate, &c.! What a number of heights yet to be ascertained, and depths to be sounded;—tides and currents to determine, with encroachments of the sea upon the land, and of the land upon the sea! How little do we know of the lowering of mountains, and elevation of plains; of the temperature of the water at different depths, and of the earth at different depths in different soils! What experiments yet to make on the reverberation of heat from different soils and under particular circumstances of aspect, vegetation, &c.! How ignorant are we still of almost everything connected with aqueous meteors, clouds, hail, &c.! What know we of the Aurora Borealis? of the formation of aërolites? In topography alone, what regions yet unexplored by, and unknown to, the inquiring eye of civilized Europe! What countless treasures may yet be reaped by the zoologist, the botanist, and the mineralogist in the vast continents of Africa, of South America, and central Asia! Yes, we know much, and yet we know but little.

But I must now conclude a paper already, I fear, much too long. Every one who has devoted his time to geographical studies must have felt over and over again the want of a proper, explicit, and comprehensive arrangement and nomenclature of the several objects of the science. Every other science has its language, and why should not geography? No epoch, certainly, was ever so well calculated for its determination as the present. It is but as yesterday that geographical societies have been formed. Their object is the advancement of science, and I cannot but regard classification and nomenclature as a most efficacious means; and when travellers shall be furnished with a systematic arrangement, and invited by the Society to adhere to its nomenclature, there is no doubt but that they will willingly conform; and their voyages and travels, universally read, would, as I have already observed, soon render general any newly-adopted terms.

To resume, then: I would beg leave to propose for the consideration of the Society the following objects, viz:—

1. The methodical arrangement and classification of the several objects connected with geographical science.

2. The adoption and promulgation of a definite, concise, but at the same time comprehensive system of nomenclature, such as

would raise geography in reality to the rank of a positive and exact science.

3. The collecting of all the well-authenticated and positively determined facts of the science, and their tabular arrangement in a concise and comprehensive form.

4. The framing of comprehensive and detailed instructions for all the observations to be made in every branch of the science.

5. The adoption of a general and improved system of maps.

J. R. Jackson.

V.—*Papers descriptive of the Countries on the North-West Frontier of India:—The Thurr, or Desert; Joodpoor and Jaysulmeer.* Communicated by Lieutenant Alex. Burnes, late Assistant-Quartermaster-General of the Bombay Army; and drawn up, in 1830, while surveying these Countries by Order of the Bombay Government. With an entirely new Map. Read 10th April, 1834.

Introduction.—In the beginning of 1828 I was directed to proceed on duty, as an officer of the Quartermaster-General's department, from Cutch to the station of Deesa; and by extending my journey on that occasion as far eastward as the mountain of Aboo, I had an opportunity of examining the whole north-western frontier of the Bombay presidency. I found that our knowledge of the countries in that vicinity was most limited; nor did the great importance attached to this portion of our Eastern empire escape my notice. In July, of the same year, I therefore made proposals to the then Commander-in-Chief, Lieutenant-General Sir Thomas Bradford, to enter on an examination of them; and, as the tracts through which I should have moved would be bounded on the west by the Indus, I ventured to suggest that, if there existed no political objections to the measure, I might be allowed to descend that river, from where it is joined by the waters of the Punjab at Ooch, to the sea. I stated that, with the permission of Government, I would enter into inquiries both of a general and geographical nature; believing that there was much of interest in these countries, as concerned their geography and the people by whom they were inhabited.

His Excellency the Commander-in-Chief brought the plan to the notice of Government in a very favourable manner, and it met with the warm support of the Governor, Sir John Malcolm, who referred it to the Supreme Government in India. Before an answer could be received from Bengal, the Governor was pleased to enter into arrangements for my carrying it into execution. He referred its feasibility, in a political point of view, to the

Resident in Cutch, Lieutenant-Colonel Pottinger, who, by his personal knowledge of the countries westward of the Indus, from his own enterprising travels through them, as well as from his present political situation near them, was well enabled to judge correctly of the proposal. He expressed, in the strongest language, his entire concurrence in the undertaking; and, to use the words of his own official communication, stated, "that it would be a highly important and creditable acquisition to our military and geographical knowledge—that it would, in a great measure, if not entirely, fill up the many unknown and vacant spaces in the best extant maps of India—and would clearly and satisfactorily connect the tracts through which Lieutenant Burnes proposed to move with the researches into, and surveys of, the more northern and western regions, which were obtained by the missions to Persia, Cabool, and Sinde, in the years 1808, 9, 10, 11, &c."

Sir John Malcolm fully concurring with Lieut.-Col. Pottinger, I was appointed an Assistant to the Political Resident in Cutch, and directed to conduct the undertaking under his instructions. The official letter to the Resident set forth, that "the Governor in council leaves it at your discretion to employ Lieutenant Burnes, in whatever quarter he proceeds, so as to make it appear that the survey is a secondary object; and this end, if attained, will vest him with influence with the rulers through whose country he travels; and will tend greatly to allay that jealousy and alarm which might impede, if they did not arrest, the progress of his topographical inquiries, if unassociated with any other pursuit."

It was considered desirable by the Government, that another officer should accompany me in the journey, and Lieutenant James Holland, of the Quartermaster-General's department, a talented and enterprising officer, was selected for that purpose. On the 1st of December, 1829, we started from Bhooj, the capital of Cutch. That no difficulties might occur at the outset, I was charged with letters of a political nature to the chiefs in Parkur, the territory which would be first entered after passing the frontier. I had also letters to the Rajah of Joodpoor, and to the different political agents under the Bengal Government, to remove any obstacles that might present themselves.

While on the eve of crossing the desert from Ajmere to Ooch, I received a communication "that it was considered, by the Governor-General in council, inexpedient to incur the hazard of exciting the alarm and jealousy of the rulers of Sinde or other foreign states, by the prosecution of the survey in their territories, or those of the chiefs over which they claim sovereignty." It only remained, therefore, to collect as much matter as was in our power, and the following papers contain an abstract of the general and geographical information which I thus obtained. A personal narrative, which details our various adventures in the desert, was

also drawn up, but it is too voluminous, and perhaps not altogether suited, for the Geographical Society. It should, however, be borne in mind, that the least interesting portion of the contemplated journey was effected; and that, instead of returning on the steps of Alexander and his Greeks, through countries almost unknown in Europe, we followed a more beaten but still interesting path.

On the Construction of the Map.—Previous to entering on a description of the countries which follow, it is necessary to detail the authority on which the geographical information rests, and the means which I have had at my disposal to construct the map which accompanies these papers.

The extreme point eastward is the camp of Nusseerabad, in Ajmeer; the longitude of which is 74° 49′ 12″, eastward of Greenwich, as deduced from a mean of five observations of the first satellite of Jupiter, for which I am indebted to Brigadier Wilson, of the Bengal army, and commanding the field force in Rajpootana. The western point is the seaport of Mandivee, in Cutch, which is in longitude 69° 34′, east of Greenwich, as fixed by several observations; in particular, by Captain Maxfield, late of the Bombay Marine.

The latitudes throughout have been determined by the sextant with the false horizon. Observations were taken daily by two different sextants; and, in most instances, the mean of the two laid down as the correct parallel, after the necessary corrections for refraction, parallax, &c. &c. had been made. The extreme point north is Jaysulmeer, which is in latitude 26° 56′ N., or about half a degree lower than in the most approved maps of India; that of Mandivee is 22° 51′ N. The parallels of latitude have been laid off on the scale of sixty-nine and a half statute miles to a degree; the meridians of longitude, on the other hand, are given according to their value, calculated by their distance from the equator.

The survey was first laid down at the scale of two miles to an inch, that attention might be given to the topography of the country; this was, however, found to be much too extended a scale, and even one-half of it would have covered five sheets of drawing-paper. The present map has therefore been reduced to that of eight miles to an inch*; and the minute account of every stage in the journal will amply supply the loss in topographical knowledge.

It was judged prudent to avoid, as much as possible, carrying any instruments or apparatus which might excite the suspicions of the people; perambulators and theodolites were therefore dis-

* This refers to Lieutenant Burnes's original map, which is in the library of the Society. The sketch here given is further reduced to one-sixth of its scale, in order to accommodate it to the similar sketch of the Indus published in the last volume.

pensed with, and the valuable compass by Schmalcalder substituted in lieu of the latter. The rate of march was, with much pains, previously determined, by a perambulator and other means, to be a few yards less than four miles an hour, and which was consequently adopted. Many opportunities also occurred, by cross-bearings from hills at a considerable distance, to judge of the justness of this calculation, and it has been verified both by them and the latitude.

The survey of the countries laid down in this map was much facilitated by the hills with which they are studded. Some of them were visible at a distance of forty-five miles, and become thus so many points to check the different portions of the survey, and which have rendered the map trigonometrical. One most important point westward was the peak over Balmeer, in the desert, from which a hill, called Goeenu, on the river Loonee, about forty miles eastward, was visible. From Goeenu there was a succession of five peaks to Chang Hill, in Ajmeer, and as the detail survey between these points had always a check from each, great correctness was thereby insured; in addition to which, a minute road-survey was made between each stage, the protraction of which is detailed in the field-books.

Lieutenant Holland, who accompanied me, wherever the state of the country admitted, took a separate route from myself, and by our joining every eight or ten days to start anew, and moving on similar points and in parallel lines, at a distance of from twenty to twenty-five miles, we were enabled to entirely fill up the intermediate spaces between our routes.

The map will be found to contain four nearly complete lines of route through the southern portion of Joodpoor, and which have finished the survey of that part of the country. Mr. Holland's route is distinguished from mine by the blue line, and the entire detours made by him amount to a distance of six hundred and twelve miles. My own survey is marked in red, and the road distance is exactly one thousand four hundred and seventy-three miles. The object, which I had in view at the outset, was to trace the Loonee river from its embouchure in the Runn of Cutch, to its source in the mountains of Ajmeer. This has been fully accomplished. Mr. Holland followed its tributary streams, and on our return south, these were thoroughly traced to their sources by that officer and myself, in the double route which we pursued. They almost all rise in the mountains of Maywar. I have also included some of my former surveys in Cutch, the Bunass river and Aboo mountain (to which I add some hundred angles); also the route across to Ballyaree in Sinde, as they could be given without increasing the size of the map. Cutch is from my own survey of that country.

It is not my desire to magnify the difficulties encountered in the construction of this map: I have had all the geographical information on the records of the Bombay government, but it did not include anything above the Loonee, and only one-half of that river. The country, lower down, though wonderfully correct, considering the data on which it rested, was found in numerous points most erroneous and defective: the Sookree river, for instance, was made to fall into the Runn of Cutch, when it is but a branch of the Loonee; and besides, its course for a considerable distance was given as unknown, and represented by a dotted line. In most parts, therefore, there was no map for a guide, and I believe that, of the territories immediately beyond the Loonee, there is really *no survey extant* by any European, except one line of route from Joodpoor to Jaysulmeer.

I might have extended considerably the size of this map by plotting off routes towards the Indus, which were collected with care, and which might have better fixed many places on that river between Sinde and the Punjab, but I considered it advisable to confine myself to what actually came under observation; for although I could have followed the approved methods of Rennell and other geographers, in laying down routes from native information, yet I doubt if I should have given a more clear general outline of the country than at present exists, or have advanced thereby the interests of geography. These papers are still by me, and may be of use at a future period.

Parkur and the Desert bordering on it.—The district of Parkur is situated under the 24th degree of N. latitude, and near the 71st of E. longitude. In extent it is extremely limited, stretching from north to south to no greater distance than twenty miles, nor is it from east to west more than thirty-five. It owes importance, in the surrounding country, as being the *only* cultivated spot in the Thurr, or little desert, which borders close on it to the north and north-west;—on all other sides it has the Runn of Cutch for its boundary, which extends inland on both extremities, and leaves it peninsulated. This small tract is interspersed with rocky hills, nearly destitute of verdure, the highest of which are called Kulinjur. A belt of low land cuts the district into two unequal parts, separating the hills of the one from the other, and is under water during rain. But for these rocky eminences, Parkur would have long since become a part of the desert to the north, or Runn to the south of it. There is a considerable portion of arable land; and the soil, particularly under the hills, is favourable for agriculture, but there is not one-eighth cultivated though it might produce three-fold.

Parkur is ruled by two Rajpoot chieftains, of the Soda tribe,

which is a branch of the Purmar, from Dhar into Malwa, who settled in Parkur, and the countries north of it, about seven or eight hundred years since. The chief person in the country is the Rana of Nuggur, but the Thakoor of Veerawow has more influence and power. The chief af the tribe is the Sooltan Soda of Omercote, to whom a degree of allegiance and respect is paid, but no tribute. The Sodas are a race favoured by nature with a handsome exterior, and the reputed beauty of their females has made a Soda wife a desideratum with every man of rank in the neighbouring country, which has led to their demanding exorbitant sums for their daughters. These people are chiefly occupied in tending herds and flocks, and doubtless, the healthful employment of the parents, away from crowded cities, has contributed to the strength and beauty of their offspring.

The predominating tribe in Parkur, is the Cooley, a set of beings hardly removed from savages. The mercantile castes, such as Lohanus and Banians, are also to be found, but, from the insecurity of trade, they are leaving the country. There is a tradition in the district that these were formerly very numerous. Charums and Brahmins (chiefly of the Ouditch caste) are also among the inhabitants, and these, with Rajpoots of the Maldee and other tribes, a few Belooch Mahommedans, Myannas and some Megwars or outcasts, make up the population to about eight thousand souls.

The present chiefs of the district are Jugajee Rana of Nuggur, and Poonjajee the Thakoor of Veerawow. Parkur itself is unequally divided between them, the nineteen southern villages belonging to the Rana, and the remaining ten to Poonjajee; but the latter likewise possesses a tract of country beyond Parkur in the desert, extending to Islamcote on the north, Bakasir on the east, and Ballyaree on the west, which gives him a territory, at the lowest calculation, of five thousand square miles. Nor is this the only source of his revenue, for he possesses the image of a Jain or Banian god, which was stolen from the temple of Goree in the desert, by his ancestors, and which he never produces without a bribe. The Rana of Parkur is an usurper, having with his own hand treacherously murdered his nephew, about three years since. In the accomplishment of this horrid deed he had a confederate in the other chief, so that a friendship has since grown up between them likely to crush, for a time, all internal disorder.

The possession of Parkur has been a contentious source of difference between the surrounding governments. Its situation would point it out as an integral portion of the Sinde dominions, but both the Rao of Cutch and the Raja of Joodpoor have had garrisons there, and it must always be subject to the strongest of the three. The power of Cutch was subverted in the reign of Rao

Lacca, about the year 1760, and it has been a province of Sinde since the elevation of the house of Talpoor, something less than forty years.

The tribute nominally rendered is one-fifteenth of the whole produce, paid in kind, of which the Rana pays two-thirds and the other chief one. In favourable seasons this may amount to eighty "kulsees" of grain, or from one thousand to fifteen hundred rupees; but the payment is most irregular, and depending entirely on the season. This sum is only wrested from the chiefs after much negotiation, and they again plunder their subjects; so that a master-stroke of policy in Parkur is to dismiss the Sindian body of horse with as little money as possible. If the chiefs refuse to pay the annual "bhuttee," or grain tribute, the party who are sent for it help themselves to camels or flocks sufficient to make up the sum. If they drive away more than will yield the required tax, the excess is deducted from the amount next year. The manner of collecting the body of horse sent to levy this tribute exhibits the peculiarity of government in Sinde. A Sirdar receives an order to proceed to Parkur: he takes with him a few horsemen of his own, collects half a dozen more from as many of his friends on the road, brings with him no supplies, and, on reaching Veerawow, gets the merchants of the town to support him and his horse until the looked-for sum is realized. The grain expended is deducted from the quantity produced, and the remainder sold for its value in money, none of which ever reaches the treasury of the Ameers, the whole being expended in fitting out the detachment to collect it. These horse consist of Beeloochees, who evince but a slight regard for the subjects of their masters, as they plunder everywhere, seizing even a single camel or bullock, which renders the Sindians exceedingly unpopular. The dominion of the Ameers is, however, established on a firm basis in this part of the country, and they have built various forts in the desert, such as Islamkote, Chailar, Kodee or Saa Gud, Meetee, and Tingalo, in all of which they retain troops, allowing none else to enter their gates.

The Parkur chiefs can assemble about five hundred horse and three thousand foot on occasions of danger; but plunder is the chief object of these people, and a foray on their neighbours' cattle tallies better with their inclinations and customs than any combined operations. Some Brahmins sat in "dhurna," that is, refusing to eat or perform the offices of nature, at Veerawow, when we were in Parkur, under a hope of prevailing on the chief to restore their stolen cattle. The country is therefore the dread of its neighbourhood, which is not to wondered at from the character of its inhabitants. The Rajpoots are known to be brave; the Myannas are men of the most determined resolution; the Bee-

looches are expert soldiers, and the Cooleys are a race of people something like Bheels, neither considered as Hindoos, nor Mahomedans, and held in high repute as warriors in the surrounding country. The whole tract to the north is inhabited by the same class of people, and it is only less notorious from their being scattered over a wide extent of territory, while the petty state of Parkur, on account of its forage and water, contains huddled together a crowd of miscreants, who regard all conduct lawful which advances their own interests.

There is not a fortification or place of defence in the district, except the hills of Kalinjur, which are about 350 feet high, and contain within their rocky peaks a strong fortress called Sardruh, abundantly supplied with water. Four paths lead up to it, and the whole inhabitants of the country retreat thither with their flocks, herds, and property on the approach of danger. These hills lie on the southern side of Parkur, and are about twenty miles in circumference. All the villages in that part of the district are built close to their base. These are constructed of most combustible materials, and consist merely of small conical grass huts, surrounded by a dry thorn hedge, so that every habitation in the country might be reduced to ashes in an hour. Conflagration does not, however, appear to be a mode of warfare adopted among these tribes. There was at one time a brick fort of about eighty yards square at Veerawow, but it has been demolished by orders from Sinde.

Parkur is open to attack from all sides, and could be approached by an army with heavy guns from the south-east by Nurra Bate; and they also might be dragged along the Runn banks; but the desert would easily be rendered impassable by filling up or concealing the wells, an usual practice with these people. The roads throughout Parkur are passable for carts, but beyond it none but beasts of burden travel.

Water is abundant in the district, and found about ten feet from the surface: it is muddy, but not so inferior as might be supposed from the vicinity of the salt Runn and desert. There are no rivers or running streams in Parkur, and tank water is less common than that from wells. There is abundance of pasture, and the soil is favourable to culture, though light and dusty; but, in the total absence of all regular government, the country yields little. The people prefer passing their time in tending herds and flocks, with which they wander from one place to another as their wants can be most readily supplied. These temporary dwellings are called "wands," and here the people prepare their "ghee," or clarified butter, from the milk of their cattle, which is the only article of export in the country, if I except the gum which exudes from the babool and other shrubs.

The only places of note in Parkur are Veerawow and Nuggur; the latter situated close under the Kalinjur hills, and nominally the capital, though Veerawow has three hundred and fifty and Nuggur only one hundred and fifty houses. Veerawow is situated on a fresh-water lake, about three miles in circumference, and formed by the rain rushing into it from the surrounding country. As the water recedes, wheat is cultivated on its banks. Veerawow is in 24° 31′ 6″ North latitude. Close to it are the remains of the city of Pareenuggur, said to have been a place of wealth and opulence seven hundred years since, though its site is only now discoverable by some temples and the surrounding country being strewed with broken pieces of bricks for two miles. The temples have been constructed of marble, and are dedicated to Parusnath, the god of the Banians. The abundance of water about Veerawow would always make it the place of first importance in Parkur; and as the commerce between the countries on the Indus and India must be carried on through the desert at some place, Pareenuggur may have been a depôt at a former period; but neither the extent of its ruins, nor the diminutive description of the temples, support the tradition of the people, that it had one thousand eight hundred Banians and "twice seven twenty (two hundred and eighty) families of blacksmiths;" nor would the wealth of the Shrawuck or Banian tribe have been shown in temples so inferior as those at Pareenuggur, none of which are higher nor occupy a greater square than thirty feet. Marble is not found in Parkur, and there is a tradition of its having been brought by sea to it when the Runn was navigable; but the difficulty would be more readily solved by having it transported from the vicinity of Aboo, where it may be had in abundance. Such undertakings are not uncommon in India, and we have a splendid example in the magnificent mausoleum of marble built by the renowned Aurungzebe at Ellora. The architecture of these temples is good; and one of the roof stones has been carved in an elegant and rather chaste pattern; they are yet surpassed by many other Jain temples. It is probable that the town of Pareenuggur was indebted for its marble buildings to those merchants or Banians who took up their residence in the country for purposes of commerce.

The hills and elevations in Parkur are invariably rocky, and the low lands are entirely free from stone. The formation of Kalinjur is generally granite, of a red colour; about one hundred feet from the summit, a black streak separates this from trap rocks. These stones, when struck, tinkle like metal. The natives believe Parkur to have been set on fire when a curse was pronounced against the country by one Parus Rookkee (a holy person, from whom the district is named). The hills of Parkur present to view a most ragged and chaotic appearance, one cone as it were overtopping another. They rise

abruptly from the plain, particularly to the north, and present precipitous sides, which are not accessible but by foot-paths. There does not appear to be any sandstone in the district, a fact rendered singular by the neighbouring country of Cutch having hardly a mountain of any other description. The Parkur people say their hills have been baked, and those in Cutch are "kucha," or uncooked.

The district of Parkur produces nothing which is not common to the neighbouring countries. Bajree and other coarse grain is reared; but rain is extremely precarious, and a favourable season in every three is more than nature bestows on it. Irrigation is unknown, chiefly from the want of the cultivating classes; and many of the inhabitants support life by the wild, spontaneous productions of the soil.

Among the sources of revenue in Parkur, that which is most productive is the possession of a Banian idol or god by the Chief of Veerawow, for which the Jains entertain a very great degree of reverence. His name is Goreechu, and he was stolen from the temple of Goree in the desert by the ancestors of Poonjajee, and is kept constantly buried in the sand, nor ever produced till a devout Jain bribes the chief, for that personage pretends that money will not always prevail on his godship to appear. Thousands of people cross to Parkur when Goreechu is exhibited, and their offerings are the sole and undisputed property of the Thakoor of Veerawow. The greatest precautions are taken to prevent the removal of Goreechu, and men of wealth and respectability are demanded by the chief as hostages previous to the exhibition. This idol is said to have been brought into Parkur from Puttún eight hundred years since, concealed in a camel-load of cotton, and charged with an order to the Purmars (as the Sodas were then called) to take charge of him. Goreechu remained in his temple till within these forty years, when one of the chiefs, judging it to be a favourable opportunity for aggrandizing himself, seized on the idol, and fled with it into the desert, which has increased, if possible, the veneration of his votaries, and greatly enriched the possessor, who has thus become the greatest personage in Parkur. The temple of this god is a handsome building about twelve miles from Veerawow, and pilgrimages are yet made to its imageless walls by the helpless and deluded Banians. The image is described as a small marble statue, about two feet high. The tutelar deity of the Sodas themselves is Chaluknaichee; but they pay a great degree of deference to Goreechu. One man said to me, "Would you have us procure our food by his means, and not reverence him?" which may be interpreted into a respect for the prejudices of those who contribute to their worldly advantage. The chiefs of Veerawow, in particular, show a respect to his godship: they will not even eat or

drink within the walls of their fort, as it was the place to which Goreechu was first removed from his temple.

Parkur is described as having had fourteen districts or purgunnas subject to it, and to have been a flourishing principality in the reign of Chundun Rana, said to be a contemporary of Lakaphoolanee. The minstrels of the country are full of the praises of this person, and trace his genealogy step by step for upwards of twenty generations, nor do the neighbouring tribes of Rajpoots deny the claim of the Sodas to this antiquity. It is a tradition, however improbable, engraven on the memory of every boy, that "Chundun Rana daily, in a reign of twenty-four years, distributed a crore of corics at sun-rise." The same traditions state, that differences arose between the Princes who succeeded Chundun and the Banians, who fled to Cutch and Kattywar, where they have since settled. There is some probability in this latter portion of the tale, for in present times the Banians close their shops and transact no business when any act of government displeases them.

The Sodas took their name from one of their chiefs, after a bloody and unsuccessful battle with the Mahomedans, in which many thousands of them are said to have perished near Kayraro, in the hills of Balmeer. From that time the Purwars were subdivided into thirty-five tribes or "saks.". I did not learn the period at which they attained such celebrity for the beauty of their females, but it has tended to demoralize the tribe, and the Sodas will now affiance their daughters to Mahomedans.

It is curious to remark the similarity of tales in Eastern countries. It is said of one of the chiefs of Parkur that, when on a journey to Balmeer in the desert, he saw five hyenas, one of which was devouring a kid, while another was feeding at a distance on a portion of it, and the remaining three looked on. This called for the assistance of his minstrel, who assured Ganga (so the chief was named), that from the marriage he was now about to make would spring up five sons; that one would be Rana or chief, the other rebel and seize a portion of his dominions, and the three continue as servants. In the opinion of these people this prediction has been fulfilled, in there being a Rana of Nuggur, a Thakoor of Veerawow, and three other principal Patels in the district, all descended from one family.

The inhabitants of Parkur use tobacco sparingly, but are much addicted to opium, which they mix with water, forming a liquid called "kussoomba." This is considered by them as an emblem of devoted friendship, and when partaken of by adversaries to seal for ever the most deadly feuds. They are very superstitious, and undertake no journey of consequence, if the first partridge, after leaving the place of departure, calls on the right side; and, strange

to say, that if this unlucky bird raises its voice on the left side as the journey is achieved, the omen is equally inauspicious. None of the houses are tiled in Parkur, it being believed that anything but thatch would offend the tutelar deity. Suttee is common, but the people abhor infanticide, though that odious custom is prevalent in Cutch. Like the Rajpoots, they look for wives among other tribes.

There is a temple in Parkur said to be dedicated to the sun, but this is a subject which appears to admit of some doubt, and may be altogether erroneous. A Charun of respectability mentioned the fact of its having been built by a Purmar Rajpoot, named Raja Soor; now "sooruj" means the sun, and this I mentioned to the man who gave me the information, but he distinctly assured me that the temple was dedicated to the sun. I examined it most minutely. It is situated on a strip of land in the lake at Veerawow, near some temples dedicated to Juck, is about eight feet square and ten high without any spire, and something like a temple dedicated to Mahadeo. Outside, on all the faces but the entrance, are marble images of about three feet high, representing an idol half standing up, with the legs crossed, but unlike Parusnath, and with a round cap placed on the head, behind which and the whole of the face is a figure of the sun. At the door-way there is a stone, which appears to have been displaced from the inside of the buildings, and on it there is also a representation of the sun.

There is no idol in the temple, but only two very small demons' heads placed on the sides as ornaments, and which are similar to the carving on the Banian temples at Pareenugger. Raja Soor is said to have lived in 1011, and the temple is now in ruins and not used as a place of worship. All the people in Parkur concurred that it had been dedicated to the sun. There is a temple to the sun at Thann, in Kattywar: the Purmars or Sodas fled in numbers to that country, and it would be a singular fact if this supplied a link to the chain of communication between the ancient Persians, followers of Zoroaster, and the inhabitants of North-Western India.

This is not the only theological difficulty to settle in Parkur, for there is a temple close to that of Raja Soor dedicated to Juck, a personage of great note at some former period, and who is said, many years since, to have come from Roomsam or Damascus. He has now no votaries in Parkur, but there are still a very few in Cutch (called Sungar), to which place he fled. He is represented as a small squat fat figure with a conical curled cap, and wears the "Zunonee" or Brahminical string. In times of scarcity or danger the Hindoos still make offerings to him. They state that boxes of money were formerly kept in this temple, and that any one in ad-

versity had only to petition the god, and promise to return the sum taken, with interest, by a stated period; but some individual having broken his vow, the heart of the merciful Juck was hardened and deaf to all future requests.

Adjoining Parkur, and close to the town of Veerawow, commences the sandy desert, or, as it is called by the natives, the "Thurr" or "Dhat." It is one continued succession of sand-hills, increasing in bulk and height from twenty to sixty, and even eighty feet, the farther they extend inland. They occur in no regular order, nor are they at equal distances from one another, often leaving valleys of two and three miles broad, which are called "dehrees," where scanty crops of grain are produced after the monsoon. The road winds round these mounds, sometimes passing over them. The sand is a dust of the finest powder. The hills are covered with stunted shrubs and different kinds of vegetation till within a few months of the rainy season, when, the herbage being burnt up, the sand is carried with violence from one heap to another, and the region is rendered nearly uninhabitable. There is no covering of turf or any closely contiguous roots on the Thurr, but there is a very numerous list of plants for such a region. The whole of these, in their berries, leaves, or fruit, though the spontaneous productions of the soil, are bountifully adapted to the food of man—a fact evincing the wise fitting of the means to the end in a portion of the globe where the most scanty crops are gleaned with difficulty from a dusty soil. The journey through such a tract is difficult; camels and horses alone traverse it, and the summit of one hill is no sooner gained than another comes in sight beyond. Hill and valley alternate, as if the surface had been troubled like the sea in a tempest, and left stationary in its fury.

The inhabitants of the desert consist of Bheels and wandering tribes of Soda and other Rajpoots, Khosas and Sindees. The only permanent settlers are the two former, and the Bheels are a stout and healthy race, generally tall, differing widely from the diminutive beings of Guzerat and Candeish. The abundance of pasture brings numbers from the vicinity of Omercote and the banks of the Indus to the southern districts of this tract, as there is much labour in drawing water for large herds of cattle at so great a depth from the surface.

The people always perch their hamlets on the summit of a sand-hill, as near as possible to the water.

A tribe of Belochees, better known by the name Khosas, lately settled in this tract. They were expelled from Sinde on the expulsion of the Kaloras, a race of princes whom they served faithfully for a long period of years. They were ill-requited, even in the zenith of their master's power, and have ever since roamed in

the desert as wandering robbers, and spread terror with their name.

The wells of the desert consist of small round holes, about a foot and a half in diameter, dug sometimes to the depth of forty and fifty fathoms, and lined with branches of trees. They are scattered through the desert, and generally found in the valleys, often in the bed of a tank or where the rain-water collects. I observed that, in such spots, the first foot of soil was almost as hard as stone, the effect, I imagine, of the burning rays of the sun on an arid soil partially wetted. The rains are slight and irregular in the "Thurr," and the water that falls is speedily absorbed by the thirsty sand. That portion of the desert which is without wells is called "rohee," and it would not be difficult to convert the whole of it into a useless waste, by filling up the few that have been dug. This is not unfrequently done by any Rajpoot chief who has been driven desperate by family feuds, or indeed any turbulent character. He betakes himself to this tract, and filling up the wells around his camp for a circuit of some miles, strengthens his position, and seeks revenge for real or supposed injuries by murder, rapine, and bloodshed.

I am ill-qualified to enumerate the botanical productions even of this sterile tract, and shall therefore give their native names.

The "peloo" is a shrub with long leaves, and producing a red berry of the size of a currant, which is much esteemed. There are two kinds of it, one growing in salt soils, and with a larger and fuller leaf.

The "khair" is of the babool kind, producing a berry about the size of an olive.

The "koomut" appears of the same description, yielding a pea and pod, both of which are edible.

The "kejra," the only shrub approaching to a tree (if we except the neem), which produces a long bean fit for food. It has a thorn and leaf like the babool.

The "phoke," which is like the tamarisk, and is the fodder of the camel. The leaves of it are useful for food.

The "kuraite," a kind of bauble.

The "boora," a sort of downy grass, believed to be a certain cure for rheumatism.

The "bair" or "bore," the berries of which are eatable.

The "babool," which yields quantities of gum for food, and branches to line the wells.

The "neem" tree, which here flourishes in great luxuriance, and is known as a specific in medicine with the natives of the East; but its fruit is used as food in the desert.

The "kandaira," milk-bush, which is used medicinally; also the "akra."

There are besides three other shrubs called "veekree," which produces a flower, "lann," which grows like heather, and "urnee," from which hooka pipes are made.

Water-melons, called "karinga," are abundant in the hot season, and there is also a fruit of the melon species, called "troosra," which is bitter and used as a medicine for horses.

The different sorts of grass are numerous. One species, called "sungaitra," abounds; another, called "murt," yields in its seeds a small grain like bajree, which is eaten by the natives.

It may be the want of what man considers as his appropriate food which has driven these miserable beings to glean subsistence from wild plants; but certain it is that this inhospitable tract would be lost to the world without them. It is singular that the rich commodity of "ghee" is so abundantly produced in a country of such sterility and desolation.

Such is the desert and district of Parkur adjoining it; and it may be well said that nature's gifts have, indeed, been here dealt out sparingly. If the people cannot find an excuse, they have certainly some palliation in plundering the more favoured sons of Adam. In the sale of their daughters and violation of a temple to extract money from the votaries of its god, we readily discover that they arise in pinching poverty and squalid misery.

THE NUEYUR.—At a distance of about fifty miles from where the river Loonee falls into the Runn of Cutch, about the latitude of 24° 30′, it sends off numerous branches. Like the main stream, these pursue a most meandering course, from the nature of the soil, through a valley, and again form a junction with the river before entering the Runn. The tract under the influence of these rivers is called Nueyur, and is a flat and fertile district, with an extent of about three hundred and fifty square miles, stretching from north-east to south-west. At its southern extremity it is about twelve miles broad, but it gradually decreases towards the northern till the sand-hills of the desert, which increase in bulk, hem in the river on both sides, and bid defiance to agriculture.

The name of Nueyur is of doubtful signification; it means, in the language of the country, *near*, and is said to be so called from the nearness of the water at all places to the surface; the term is confined to the portion of the country under irrigation from the river, and is never applied to that beyond its influence. Wheat is its universal production.

The Nueyur is studded with villages; the chief places of note are Gurra and Nuggur, both on the western bank, the one with a population of about two thousand, and the other of one thousand five hundred souls. Altogether there are about forty inhabited places in the district. It is very populous as compared with the

neighbouring countries, for to the west is the Thurr or sandy desert, and on the east the district of Sachore, which has a scanty and indifferent supply of fresh water. In its course through the Nueyur, the Loonee river seems to have separated one portion of the desert from another; for on either side the general features of it are easily recognised in the occurring succession of sand-hills and the growth of plants indigenous to a sandy country. The mounds on the Sachore side are much smaller than on the other, and the river probably prevents the sand from blowing upon them. The traditions of the people record that the Nueyur was an arm of the sea when the Runn was under water.

The Loonee river, which contributes so much to the fertility of the Nueyur, is here most diminutive. It is rather a torrent than a river, nowhere is it a running stream but in the rainy season, nor throughout the Nueyur is it broader than one hundred and fifty feet, nor deeper in its channel than ten or twelve below the level of the country. This shallowness causes great and sudden overflows during the rains, for the Loonee is the only channel by which the rain that falls in Marwar, and the mountains eastward of it, is conveyed to the ocean. The richness of the Nueyur doubtless arises from the alluvion which it deposits in the inundations—these do not occur annually, but are irregular and dependent on the quantity of rain that falls.

The Loonee, though it be not at all times a running stream, has pools of water in its channel, and affords an ample supply of water from pits or wells dug in its sandy beds, which are a great blessing to the inhabitants of such a country. Herds of cattle likewise derive from the rich pasture of its meadows a nutritious support, and the oxen and kine of the district are of a superior description. Buffaloes are reared in considerable numbers, and there is also abundance of fodder for camels. Wild hog and game abound on the banks of the river among the peeloo and tamarisk shrubs, which are generally to be found in Indian rivers. The presence of herds and flocks brings the tiger, hyæna, and the wolf, with other beasts of prey, to the banks of the river; crocodiles are found in the pools, but of a small description; wild duck and partridge abound, and among the latter is the black partridge, noted for the richness and beauty of its plumage.

To the Loohee alone is this abundance of animal and vegetable life to be attributed.

When the inundation does not attain the necessary height to irrigate the country, the fields are watered by artificial means, and with great facility, from the proximity of the water to the surface. An abundant havest is derived. During some seasons the Nueyur is a sheet of water, and the Loonee river sometimes discharges the superfluity of its waters into the desert.

The soil of the Nueyur is a brownish clay, very tenacious and yielding crops of the heaviest kind. The beds of all its branches are sandy, but the soil near them is slimy.

The humid soil of the Nueyur does not appear to have any effect on the constitutions of the inhabitants, but they may escape the diseases incidental to such places from the elevation of their villages, which are always built on mounds or sand-hills to prevent calamity by a sudden overflow of the river. Some of the people complained of an enlarged spleen, which was universally attributed to too copious a use of water (perhaps of an indifferent sort) when suffering from fever. The variation of the thermometer in the Nueyur is more evident than in the neighbouring countries. At sunrise, in December, it fell below 32° and rose to 80° in the heat of the day. The houses of the inhabitants in the larger places are constructed of sun-dried brick procured from the river; but in the smaller villages they have conical grass huts, which are peculiar to the desert; they are like bee-hives; the twigs of the "phoke" form their walls, while the roof consists of those of the "akra" covered with grass. The poverty of the country is seen in those simple dwellings; and the following couplet, which is a proverb in the country, describes this portion of Marwar:—

"*Akun kee lukree phokon kee war,*"
In the "akra" twigs and phoke walls;
"*Ditee Raja teree Marwar.*"
Behold, oh king! your Marwar.

The inhabitants of the Nueyur consist chiefly of the Chuwan and Rhatore Rajpoots and their retainers. It is in the dominions of the Raja of Joodpoor, but is not a separate province, being partly in the districts of Jhallore and Sachore.

The wealth of the Nueyur early attracted the attention of the Khosas of the desert, who have made such havoc among its herds that great part of the population have quitted it for a less disturbed, though less favoured country to the eastward. Those who still remain are of necessity compelled to pay an annual tribute or black mail to these robbers, and by a sacrifice of a portion of their wealth secure the remainder.

They pay a tax of a "sye" or two maunds of grain, and a rupee on each plough.

The dread of the Khosas is nevertheless very great among these people, for they yet cross the Nueyur to plunder farther in the interior of the Joodpoor territory.

The approach of a body of Khosas excites a great alarm among the people; they have a fellow-feeling for each other, and the intimation travels by express camels from one village to another as

quick as ever did the Cross of Peter the Hermit when he preached his crusade. The lands in the Nueyur are held by feudatories of the Joodpoor chief, who received them on condition of protecting the frontiers. They are styled " Boomias," and are free from any other burdens than what the Khosas have imposed upon them.

JAYSULMEER.—The principality of Jaysulmeer is one of the five Rajpoot states lying on the north-western side of India. Of all of them it is the least considerable in importance; it has not the wealth or resources of Joodpoor or Jyepoor, nor has it the family importance which exalts Oodeepoor; and though nearly on a par with Beecaneer, it is inferior to it both in revenue and political importance.

Jaysulmeer occupies a space of about twenty thousand square miles; it is a country of an oblong, but irregular shape, with the greatest length from north-east to south-west, which may be estimated at one hundred and eighty miles. Its average breadth is sixty. It is comprised between the parallels of 25° and 28° of north latitude, and meridians of 69° and 72° of east longitude. The capital, Jaysulmeer, is below the centre of the space so bounded, about the line of 26° 56′. This country is the residence of the Bhattee tribe of Rajpoots, and is ruled by a chief of the body, called Rawul.*

Two centuries ago the territory of Jaysulmeer was much more extensive than is above described, and is said to have comprised the country around for a distance of two hundred and fifty miles, and to have had its western limits bounded by the Indus. It has been the misfortune of this state to become unhinged by a turbulent and predatory race of chieftains who held lands on the extremities of the kingdom, where they could defy the attacks of their ruler. A succession of internal feuds among themselves has, on more than one occasion, led them to commit acts of infidelity towards the state, and to surrender the frontier forts to their enemies.

The Daoodpootras, on the north-west, have risen into importance partly by the dismemberment of Jaysulmeer, but it is surrounded on all sides by powerful neighbours. To the east, south, and south-east adjoins Joodpoor, and to the south-west it has the territories of the Ameers of Sinde, and their relative, Meer Sohrab. To the north-west is the country of the Daoodpootras, and to the north and north-east that of Beecaneer. Thus encompassed by five different powers, Jaysulmeer has been kept in a constant state of disorder. Eighty years since, the Daoodpootras wrested from it the fertile territory towards the Indus, and about the same time Dilawur and its dependencies were also sur-

rendered through the treachery of its chief. Joodpoor, on the other hand, has possessed itself of Pokrun, on the east, and the surrounding territory. Pooggul, with its dependent villages, has transferred its allegiance to the nearer capital of Beecaneer, and the country left is but little better than the desert which environs it.

On the partition of the nine forts of Marwar, as the traditions of the country have it, the portion which fell to the share of the Bhattee Rajpoots was Loodurwa and its territory. This was the old principality of Jaysulmeer, the capital of which, so named, is now a mean village, about eight miles westward of the modern city. About fourteen generations since, the chiefs of Jaysulmeer took the title of Rawul, or Lord, and bound themselves to adopt an orange colour as a national emblem, in their tents, horse-cloths, &c., to which they still adhere, and for which they believe that their rule will be stable. The first exploits of the Bhattees are disfigured by fabulous tales, among which occur both gods and men. The earliest authentic fact which is preserved is the reign of one Jaysul, a prince of ambitious views, who founded the present capital and the beautiful castle of Jaysulmeer, so called from his name. Since then Jaysulmeer has been deservedly famous for its battlements, which, in the songs of the country, are said to surpass, and I believe with truth, those of Agra, Delhi, and Beecaneer.

The country was invaded by the Delhi sovereigns in the reign of Jaysul, and subdued by the Mahomedans after a siege of twelve years, but it was ultimately restored to the Bhattee chiefs. The era in which this prince reigned is difficult to determine, some believe it to have been seven hundred years ago. From that time the coin of Jaysulmeer has borne the name of the Delhi sovereigns on one side, and that of the ruler of the country on the other. Among the Rajpoot states, the reigning princes seldom coin in their own name, but in that of some distinguished ancestor.* The rupees of Jaysulmeer are of Ukia, those of Joodpoor, of Beejy; both deceased rajahs.

A list of the Rawuls, for the two last centuries, presents to view the names of three who have each reigned upwards of forty years, though the period has been a calamitous one for the state; with two exceptions at the beginning of the era alluded to, when the government was disputed, all have died a natural death.

The present Rawul, by name Guj Sing, ascended the throne about eleven years since; he is a mild and popular prince; his predecessor Moolraojee formed a treaty of friendship with the British government which has been rigidly adhered to by Guj Sing. His father and grandfather are both living, but blind; and he owes his elevation to the favour of a minister, who excluded two elder

brothers. This minister, though a Banian, and mean in origin, ingratiated himself with the Rawul, and actually possessed the whole power of the state. His arbitrary conduct excited the passions of the son of Moolraojee, by name Rassingjee, who murdered the minister's father, and fled to Joodpoor. Here he resided for ten years; but this long lapse of time was insufficient to moderate the revenge of the Banian; he invited the young prince, with his family, to return, and immediately on their entering the country, dispatched him and his two sons by poison. Human nature shudders to believe that the parent could have been an accessary to such a deed; but it is currently believed, that Moolraojee knew of his minister's intentions.

The Bhattee chieftains are constantly quarrelling with each other, and quit the country on the slightest cause of offence, that they may re-enter it, and demand justice by force of arms. They then inflict on it every injury they can devise, so that the effects of these frequent turmoils are much felt in so contracted a territory. It is difficult to comprehend the feeling which so soon estranges a chief from the soil in which he was reared, and leads him to heedlessly persecute the innocent inhabitants of his native place, to gratify his revenge. In following the dictates of this passion, neither sex nor age is a safeguard. Old and young are despoiled of their property, and sometimes slain in protecting it; children are stolen from their parents, in hopes of ransom; and the herds and flocks become the prey of him who, but a few days previous, would have willingly sacrificed his life to protect their owners from plunder.

The principality of Jaysulmeer is barren and unproductive, with little arable land; but there is, nevertheless, a distinction of a marked nature between it and the "Thurr," or desert, which surrounds it. The one is rocky—the other sandy. Jaysulmeer, in general, has an uneven surface, and is covered with low rocks; none of them ever rise into hills, or can be said to run in chains, being indiscriminately scattered throughout. Cultivation is most scanty: there was scarcely a field for forty miles, nor would more than a third of the land admit of tillage. The parts which are cultivated yield good crops of the coarser grains, such as bajree and moong, which form the food of the inhabitants. There is not a wheat field in the country; and the cotton crops are only reaped after a three years' fostering care of the husbandman.

In some of the valleys to which the rain-water descends, a plant called "ikkur," a sort of hemp, grows wild, and cordage is made from it by the usual process of steeping in water.

The soil of Jaysulmeer, where the sand-hills do not run in upon it, is a light, clayey sand: when it sufficiently covers the rocks, it affords tolerable crops.

The district is better suited for pasture than agriculture, but neither herds nor flocks are abundant. The cattle are not of a superior quality; the sheep are small, and resemble more the animal of Europe than Asia. The ghee of the country is said to possess a peculiar flavour, which makes it prized—arising, as is believed, from the nature of the grass. The wool of the sheep is also, from the same cause, said to derive the superiority which it undoubtedly possesses over that of the neighbouring countries—Beecaneer excepted.

The periodical rains are scanty and uncertain, and water is seldom or ever found nearer the surface than one hundred and eighty feet. The wells, in some places, were even so deep as eighty fathoms, or four hundred and eighty feet. The absence of this necessary of life has induced exertions of an extraordinary nature to preserve the water of the heavens: large and spacious tanks occur every two or three miles, and the hard clayey tenacity of the soil, in which they are dug, retains the supply for a long period. The dykes of these tanks present a compact rampart, which, with very little pains, might be converted into purposes of defence.

Jaysulmeer has no rivers. After the rains, it is said that water is found nearer the surface than at other seasons; which seems probable, for there is no channel by which it may be carried off, and it no doubt sinks into the soil. So great, however, is the labour of drawing water from wells, that they are never used if it be possible to procure a supply elsewhere.

Approaching Jaysulmeer from the south, the depth of water from the surface increases, though there is no perceptible rise between Balmeer and Jaysulmeer. The well water of the one is sixteen, and the other sixty fathoms from the surface. The whole territory of Jaysulmeer is hemmed in by sand-hills; and the whole country is strewed with small, white, round pebbles of quartz; and, strange to say, the summits of all the elevations, even among the sand-hills, are covered with them and gravel. In the "Thurr" itself, the hills are always of unmixed, pure sand, though there are rocks of limestone, porphyry, &c., dispersed over it at different places.

The sterility of Jaysulmeer arises from no political causes. The little wealth which it does possess springs from its central situation, as being a place of note between India and the Indus, and the duties imposed on the transit of merchandise thus sent constitutes nearly the every resource of its ruler. It has no exports of its own, and the only article peculiar to this country (though it is also manufactured in Beecaneer) is a kind of woollen cloth, of very fine texture, called "looee," deriving its superiority from the wool, which is very soft, and always of a white colour. The white sheep

which yield this valuable commodity are not found in India, where the animals are larger, and often black. Between Jaysulmeer and Joodpoor, a distance of one hundred and eighty miles only, this difference even is marked. The "looees" of Jaysulmeer, however, are in no demand: they may be had at the value of from four to forty rupees.

There are some merchants of opulence resident at Jaysulmeer. From twenty to twenty-five thousand maunds of opium pass annually through the country to Sinde, from which it is exported, by Kurrachee Bunder, to the Portuguese settlement of Demaun. Sulphur, assafœtida, rice, and tobacco, are the return articles of transit from Sinde. From Malwa, it receives indigo and cloths, chiefly cotton; from Jeypoor and Delhi, sugar; also, iron and brass from Nagore; and as every thing depends on the tranquillity of the country, that no suspension of trade, and consequently decrease of revenue, may arise, the Rawul of Jaysulmeer has a great inducement to live at peace.

The revenues of Jaysulmeer are inconsiderable—something under two lacs of rupees yearly, and more than half of this sum is derived from transit duties. On each camel-load of opium twenty rupees are levied. The remainder of the sum is made up by fines and levies, and the land revenue, which latter does not exceed one-tenth or one-eleventh of the net produce, is chiefly derived from Beecumpoor, and its eighty-four villages. There are also about twelve hundred rupees derived from a monopoly in salt, which is made about sixty miles north-west of Jaysulmeer, in a saline tract among the sand-hills; but this article, as well as grain, is imported from the neighbouring countries.

Jaysulmeer, everywhere but in its capital, bears the strongest marks of poverty.

The city of Jaysulmeer is handsome; its houses are lofty, and even spacious, terrace-roofed, and built entirely of a hard, yellow kind of marble, which is sometimes elegantly carved. The streets are wide for an eastern city, and some regularity has been observed in laying them out. It cannot contain less than twenty thousand souls. The fort, or castle, of Jaysulmeer, which crowns a rocky hill on the south-western angle of the city, has a most commanding and magnificent appearance. It is triangular in shape, presenting the two longest sides, which are each about three hundred yards, to the west and north. It is a mass of towers, built of hard, squared stone, tapering to the top, and which are studded over every acclivity of the hill almost to the exclusion of the curtain. In all places, this mass of fortification is double, and in some places treble, and

* About 20,000*l.* sterling.

even quadruple. It is built on a rock about eighty or a hundred feet higher than the city. There is but one entrance, which is on the north side, and leading through four narrow and strong gates. Some of the towers are forty feet in height, and the whole works are completed with firm and substantial masonry. The rock is scarped, and built up at the weak points; altogether it is a place of considerable strength. The inhabitants say it has one hundred and seventy-five towers, and to all appearance they do not exaggerate, for they stud the brow of the hill on all sides. The interior of this building is occupied by the Rawul and his household. It is supplied with water from wells found at eighty fathoms from the surface.

The city and fort are surrounded by a wall, but it is a most inferior line of defence, consisting merely of a rampart of loose stones, about twelve feet high. In some places, it is even buried by the sand that has been blown from the desert. The city is about two miles in circumference, of an oval but irregular shape, overlooked, to the north, by a rocky ridge, which runs in upon the town, and over which the wall runs. To the south-east there is a spacious tank, and on all other sides Jaysulmeer is open.

The smaller towns and villages of Jaysulmeer, particularly those near the capital, have a remarkable appearance, and look at a distance like forts, which they may be in some degree considered, for they are terrace-roofed stone buildings, so disposed, with regard to each other, as to make an excellent defence, and present a wall of some length and thickness on all sides of the village.

The scarcity of wood in the country, unless of a stunted description, has made the inhabitants erect their houses of stone, which is not common in India. The conical grass huts of the desert are found in Jaysulmeer. There is no place of any size in the district, except the capital. Beecumpoor is the largest.

Jaysulmeer is thinly peopled; its chiefs, the Bhattee Rajpoots, compose the bulk of the inhabitants. The most remarkable tribe in the country is the Paleewa Brahmins, who are peculiar to Jaysulmeer. They fled from Pallee, in Marwar, on account of oppression from the Mohammedan rule of Delhi, and settled in this country some centuries since, when the then reigning prince promised them protection. Since that period, they have grown into power and affluence, and received numerous villages in free gift, but they principally confine themselves to trade, having houses at Pallee, and every other place of commercial opulence around, from which they return, in the evening of life, to spend their fortunes in Jaysulmeer.

Charuns are numerous, and possess many of the villages in free gift. They are the minstrels, or bards, of the Rajpoots, and have

as much weight in Jaysulmeer as in other countries. A mounted horseman is not allowed to enter a Charun's village; and, when plunder and desolation pervade the land, the possessions of these people rest in security. If, by accident, their cattle be driven away, the bare mention of the fact is sufficient to have them restored.

Banians are numerous, and have much temporal authority, being the men of business among the Rajpoots. One of their members is generally at the helm of affairs as the minister, an honour which is now and then shared with them by Brahmins.

In power the Banians are oppressive—they have imbibed most of the bad, with few of the good, qualities of the Rajpoot. They even adopt the titles of a Rajpoot, and the designation of "Sing," or lion, is an affix to the name of a Banian of rank, with which he is not disposed to part. They are vindictive, rapacious, and cruel, lavish always of the public money, while they are careful to a degree of their own. In authority, the Banian presents everything that can be conceived as opposite to his habits when a common citizen—mildness, meekness, and humility give way to pride, insolence, and intolerance.

There are few Mohammedans in Jaysulmeer; they are in general herdsmen of the Joonaija, Hingorja, and other erratic tribes, who lead a pastoral life throughout the Thurr and the countries bordering on it.—"Rehbarees," the common tribe of shepherds in other districts, are unknown in Jaysulmeer. There are a few Jhats and Rajpoots of other tribes than Bhattee, a small portion of the low-caste Hindoos and some Bheels. Altogether, the population may be estimated at something less than three hundred thousand souls, which gives only thirteen to a square mile,—scanty indeed, when a hundred is not unusually to be found in some parts of Asia.

Jaysulmeer has no peculiarity in natural history differing from what is to be found in the adjacent territories. Its general openness frees it from the scourge of lions, tigers, and other rapacious animals: it has foxes, wolves, jackalls, and hyenas, and some diminutive species of wild cats; antelope of several kinds are very numerous: hogs are found, but not in abundance; also wild duck, partridges, and hares; but I am disposed to chime in with an opinion of the people, that the uncertainty of water prevents both the animal and vegetable kingdom from thriving in Jaysulmeer. The "kulum," a bird of passage from the northern climates, and which swarm in Cutch and Guzerat in the cold months, is not to be seen in Jaysulmeer. The reptiles are numerous; scorpions and centipedes abound under the small, loose, rocky stones which cover the hillocks; the sand-hills are

honeycombed by the desert rat. Vultures and hawks are abundant; and I also remarked the raven, which I believe is not generally seen in India. The camels of Jaysulmeer are small, and not so highly esteemed as those of Marwar. The animals used by the merchants for the transport of goods have by no means a strong appearance—they are lean and lanky. The horned cattle are indifferent, but not diminutive. Buffaloes are reared: they are turned loose, without an attendant, to graze, and return of themselves to be milked.

The climate and temperature of Jaysulmeer does not differ from what is to be expected from its position: while the sun is south of the equator the cold is great; on the other hand, the heat of summer is most oppressive from the vicinity of the sand-hills of the desert. Sand is universally allowed to be a cause of heat, and it assuredly also, in the cold season, contributes to the general bleakness. On entering the sand-hills from the plain, the increase of cold was always perceptible, and on dismounting from horseback it could be felt through the sole of the boot. For ten days in January the thermometer never rose above 75° at 2 P.M., nor sunk below 30° in a tent at sunrise. Ice was to be seen daily, but it never exceeded a quarter of an inch in thickness. The large tank of Jaysulmeer was frozen in the morning. I remarked a peculiarity in the wells. In the morning they were always to be seen sending up a vapour like smoke, and, instead of drawing water of a proportional coldness to the depth from the surface, it was quite warm; I find, too, that this is not at all peculiar to Jaysulmeer, but common in this part of India. At one place, where the water was only twenty-five feet from the surface, I found its temperature higher than that of tank and river water by 12°, and 3° above that of the atmosphere at about ten in the morning. In the hot season, there is said to be no difference between the temperature of river and well water, which is only observable in the cold months; the deeper the water is from the surface, the greater will be the heat. It it difficult to account for this fact, unless it is believed that rain heats the ground, and consequently the water; for the natives have an idea that the snakes, which come out of their holes after rain, are expelled by the heat and closeness.

The influence of the S.W. monsoon is unquestionably felt at Jaysulmeer, but the fall of rain is described as less than in the countries eastward of it. Approaching the Indus from the East, rain is more and more scanty. In Malwa the fall exceeds that of Meywar, and again the rains in that principality are more heavy than those of Marwar, while, in the latter district, they exceed those of Jaysulmeer, where they are more abundant than the

country of the Daoodpootras beyond it. I believe it has not yet been determined how far the influence of the south-west monsoon extends.

The vicinity of Jaysulmeer to the Mahommedan nations westward of it, and the approach to Persia, are discoverable in the dialect of the people. The language in common use is Marwaree, which is a distinct dialect. In Jaysulmeer numerous Persian words occur, but there is no difference between the language of the higher and lower orders—all speak Marwaree. The Rajpoots are too proud to turn their minds to learning, and it is rare to find any of them, even the highest, who can either read or write, though they are the rulers of the land. The children of the Banians and Brahmins are alone sent to school, and it is to this advantage in early life that they owe their after-influence in society.

Jaysulmeer is as destitute in the mineral as in the vegetable kingdom. I could not hear of any metallic substance being procurable in the country. In one spot the rocks seemed impregnated with iron, but this was doubtful. The stone of Jaysulmeer is primary limestone of a dark yellow colour, not unlike kiln-burnt clay. Some of it is more closely grained than others, and one species, called by the natives "baidoo," is exceedingly hard, and takes on a rich polish; it is marble, and in great request, and is to be found in different parts of the country formed into various descriptions of vessels. It is fit for purposes of lithography, and may be had in blocks of sixty and eighty feet without an intervening vein. The richer edifices in the capital are ornamented with it, but the common stone of Jaysulmeer is also well adapted for that purpose. It is curious to behold lattice and net work as neatly executed in stone as if it had been the labour of the first artist in sculpture. The architecture of Jaysulmeer is handsome, I imagine, from such an abundance of good material. The tombs and pagodas have a near resemblance to the style of the Chinese, and the pillars are exceedingly light and chaste. The house, or mansion, of the late minister is most handsome; from its appearance one would imagine the carving to be in wood, but it is deeply cut in stone, and richly beautiful; it towers over every building in the city, and tapers to the summit. Much money has been wasted in the interior ornaments of gilding, &c., but they sink into insignificance when compared with the exterior.

The sand hills of the desert, or Thurr, as it is more properly called, attracted my most particular attention. At one place I crossed a tract of forty miles with them intervening at intervals, and particularly noted their appearance at the edges and centre. They occur in no regular order, and for some time I considered them as a chaotic confusion of mounds; latterly I discovered this opinion to be erroneous, for the bluff sides, particularly at the

edges, were always turned towards the east or north-east, and the sloping sides in a contrary direction, which agrees with the influence that the prevailing winds must always exercise over this tract. The sand hills were partially overgrown with grass and jungle shrubs, which in some places were burnt up or blasted by the cold, for the "phoke" and "akra" wither and die under it. None of the mounds were naked, excepting such as had been cleared near a village by the hand of man. The sand hills had an appearance of permanence as much as other hills, but there can be no doubt that the sand of the one is blown on another during the winds of the hot months. At this time vegetation is parched up, and the natives spoke with dread of the approach of that disagreeable season.

It would be useless for me to enter on any general account of the Rajpoots of Jaysulmeer, as they differ in no way from other tribes of that people. They have, in common with them, those keen feelings of honour and high notions of their dignity. There is as much nicety observed in taking their seats before their prince, as if their lives depended on the proximity to him. In the absence of certain chiefs, their place is left vacant. The Rajpoots of Jaysulmeer have followed the modern fashion of the neighbouring states in their rage for wives of the Soda caste. The Rawul has one of them; but the lady of the first consequence in his seraglio is the Seesodia Ranee, for whom he made a rapid and romantic journey to the city of Oodeepoor, some years since.

I may mention something concerning the interview with the Rawul of Jaysulmeer, which will serve to give an idea of the appearance which he is enabled to maintain, and his people generally. After all preliminaries had been arranged, we entered the city in the afternoon, about five o'clock, and reached the gate of the castle in about five minutes, where our people were detained; we continued to advance on horseback, and passed through four strong gates, till we alighted at the door of the palace, and were conducted, by an officer of the court, through five or six courts, and as many narrow and dark staircases, leading from one area to another. Every place, where the space would admit of it, was lined with the guards of the prince, there being a different description of men in each court. The Seiks, I observed, were nearest the person of the prince. Two flights of steps from the summit, we were met by the prime minister, a Brahmin, and introduced by him to the prince. On entering, Gujsing rose from his throne, which was at one end of the room, and, advancing a few steps on a cushion, stretched out his open hand, (which is simply touched by the person introduced,) and then desired us to be seated on a cushion, spread in front of his "gaddee," and nearly on a level with it. On both sides of him sat the chiefs and

men of influence in the country, arranged in regular order; behind him were his relations and domestics, and on his right hand stood his minister. There might have been three hundred persons present, but the apartment was small and without ornament: a strict silence was preserved, and this, with the cleanly whiteness of their garments, gave a considerable solemnity to the scene. The appearance of the Rawul himself was most dignified: he is rather stout, but has both an intelligent and pleasing countenance. He was plainly dressed, without any other ornaments than a pair of elegant gold bracelets, and an ornament of rubies and diamonds on his turban, which latter was of blue speckled cloth, exceedingly small, higher on one side than another, and not unlike a Persian cap. Before him stood his shield, which was handsomely, but not richly ornamented; the bosses were of amber, and the flowers embroidered on it were of precious stones.

He was most affable during the interview, which lasted nearly an hour. He was full of professions of friendship to the British, and urged most strenuously that his own anxiety, and that of his ancestors, to cultivate the favour of the government, were proof sufficient of his sincerity. He offered a private interview to us, which was declined. He was most anxious to be informed on various points relating to our customs—how we ate eggs, and in what manner butter was used in our food, and some other such questions, showing such an ignorance of our habits as was to be looked for from one in his remote situation. He betrayed, nevertheless, no surprise at our dress, but made a particular request afterwards for some articles of English manufacture. In opposition to the general taciturnity of such assemblages, the Rawul alone spoke, and he did so almost without intermission; his courtiers shouted in exclamations of admiration as he finished each sentence. On quitting the palace, the usual ceremony of presenting us with "betel nut" was attended to, and the Rawul himself sprinkled us with sandal-oil and rose-water. All these articles were brought in on salvers and vessels of gold, richly embossed. His highness made us presents of two horses, with shawls and cloths, of some value. He also sent us six trays of presents, some basketsfull of sweetmeats, and insisted on guarding and entertaining us while in his capital, and evinced no jealousy in our visiting all parts of the city.

JOODPOOR, OR MARWAR.—Joodpoor, or Marwar, is the most extensive principality of Rajpootana, and one of the largest dominions now ruled by any native prince in India. It has a rival among the Rajpoot states, in the neighbouring territory of Jeypoor; but the Rajas of that country, though possessing an equal revenue, are more circumscribed in power and limits. Joodpoor must ever exercise more influence in

the affairs of the adjacent country, as the ruler of it is a Rhatore, the tribe which includes by far the most numerous portion of the whole Rajpoot race. The Rajas of Beecaneer (one of the five principal states), Kishengud, Eeder, Rutlam, with many others of inferior note to the eastward, are all Rhatores; and the Joodpoor prince being allowed on all hands to be the head of the family, he must be considered as the chief of a great nation, and exercising influence beyond the line of his own wide-spread kingdom.

The territory immediately subject to Joodpoor extends from east to west about two hundred and sixty miles, and from north to south about a like distance. It is contained between 70° and 75° east longitude, and 24° and 28° north latitude. On the east it has the states of Oodeepoor and Jeypoor, with the British territory of Ajmere, from all of which it is separated by a massy bulwark of mountains. On the north it adjoins Beecaneer, and to the west it has the territories of Jaysulmeer and Sinde. So late as 1813, it had the fortress of Omercote, near the Indus, as its boundary in that quarter, but it was then captured by the Ameers of Sinde; since which, the line of boundary between these powers has been a constant subject of dispute. On the south, Joodpoor has the district of Seerooee, and Thurraudree, which is tributary to the Dewan of Palhanpoor. Seerooee was, at a late period, a portion of the Joodpoor dominions, but the Rao (so the chief is called) is now independent, and posesses a tower of strength in the massy mountain of Aboo. Joodpoor occupies about seventy thousand square miles.

The Joodpoor dominions are, generally speaking, well peopled, and the territory is valuable. Its wealth seems hitherto to have been much overlooked; and it has been erroneously considered as a portion of the sandy desert. Its exports in wheat are considerable, and the soil is favourable to many other descriptions of grain; and in the central parts most productive. The country consists of open and extensive plains; the hills are confined to the southern parts, below the Loonee river. To the north and west, Joodpoor extends into the Thurr, or, as it is called, the Desert; and, though the soil is poor, yet the valleys among the sand hills furnish a superior description of bájree. In different parts of Marwar there are extensive tracts of land impregnated with salt, which yield large quantities of that commodity. Lead and antimony are found in the hills of Joodpoor, but the country has few treasures of the mineral kingdom.

The present Rhatore race of Joodpoor have a well-authenticated account of their lineage for many generations. They came originally from Kanoje in Hindoostan, and are descended of Seeajee, rajah of that place, who was invited by the Palleewa Brahmins of Pallee to be their lord, in Summut 1176, about A.D. 1120. Imme-

diately after this event they possessed themselves of the country of the Goel Rajpoots at Keir, on the Loonee; and also of that of the Puriar Rajpoots of Mundour, the old capital of Marwar. Two younger sons seized on Eeder and the countries around. From Seeojee they give eleven generations to one Ridmuljie, who had twenty-four sons, from whom the principal Rhatore families now claim descent. The youngest of these, by name Jôda, by unanimous consent was raised to be ruler; and built the present city of Joodpoor as his capital, in Summut 1515, A.D. 1459. For five generations from Joda, the title of the family was simply that of Rao, but the Emperor Acbar conferred on Oodeesing that of Raja, which his posterity have retained. From Oodeesing there have been only ten princes to the present Raja Man Sing.

The above outline of events in Joodpoor was procured from the records of the chief of Awoh; and it is corroborated on all points by other history. The rajas of Joodpoor were in high favour with the Delhi sovereigns, of whom latterly they held their lands: Servant of Delhi is one of the titles retained by them on their seal; and they are still proud of displaying a flag which was conferred on them by the House of Timour. The Moghul influence in Joodpoor was followed by that of the Mahrattas, to whom tribute was paid by the rajas till the British interfered to settle matters in Marwar. Of the history and politics of this country, since it entered into a treaty with the East India Company about eleven years since, everything is known, and I dwell not on the subject.

I will not pass over in silence, however, the present Raja of Joodpoor, Man Sing, who has acted so prominent a part in the affairs of Rajpootana for these twenty-five years past. He succeeded to the throne on the death of his cousin, Bheen Sing; and, fortunately for himself, held it when the British formed their treaties with the state; as the posthumous son of his deceased relative has, since then, made several unsuccessful attempts on Marwar. This young man is believed by many to be of spurious origin. The character of Raja Man Sing is full of contradiction; he is, at the same time, a man of superior intellect, and the slave of the priesthood—the servile imitator of men who have adopted the garb of sanctity to advance worldly ends, and yet a most able and wily politician, full of energy and firmness when such are required of him. He has exchanged the religion of his forefathers for one which excites abhorrence in the minds of his people; yet his sincerity in the creed is doubted. For some years past he has withdrawn himself from an active share in the concerns of the state; and, to all outward appearance, is employing the remnant of his days in acts of charity and devotion: yet it

is known that he keeps a vigilant eye on all that is passing in his government. It is more than probable that his secession from pomp and state arises from his wish to avoid his nobles, many of whom have acted treacherously towards him. This semblance of devotion is probably assumed, for Man Sing, when formerly overpowered by a cabal in his kingdom, feigned the part of a religious lunatic, and was placed as such under restraint. When the storm had passed he threw off the disguise of insanity, and has since ruled with a vigour which has terrified his chiefs, and lost for him the esteem of his brotherhood.

The chiefs of the Rhatore nation are numerous and powerful; they hold their estates, like those of others in Rajpootana, on the tenure of military service; and it is said that the Raja of Joodpoor can bring into the field, on an occasion of common danger, not less than sixty thousand men, exclusive of mercenaries entertained by himself.

The tenure on which these nobles hold their lands will serve to explain their power, and the wealth of the kingdom at large.

Land in Joodpoor is held on these tenures:—first, by chiefs, or Pataeets, as they are called from the word "putta," the title of the document; secondly, by Boomeeas, who are grassias, and so called from "boom," meaning land; thirdly, by religious orders.

1st.—The lands held by the Pataeets, or different Rajpoot chiefs, are not resumable by the raja; but if any chief conduct himself in a rebellious or contumacious manner towards the government the raja can lay his estate under sequestration, but it must be ultimately given to another member of the family. These lands are portioned out on the condition of each landholder furnishing a mounted soldier for every thousand beegas; or, as some have it, for every thousand rupees of annual income derived therefrom. This contingent is at all times liable to be called on to serve anywhere within the dominions of Joodpoor. When occasion requires it, each Pataeet is also bound to bring along with his quota of horse all his retainers and the younger branches of the family, whom he supports as being their chief. On such occasions the chieftains have an inducement to serve with credit, as they are rewarded for important services by additions to their estates. The raja may increase the contingent of any Pataeet by giving him more land, but it is not in his power to make a "Boomeea," which is the second tenure on which lands are held in the kingdom.

2d.—Boomeeas hold their possessions by grants of an old date, and have had them conferred for services rendered. They are virtually relieved from all taxes, duties, or calls of service. Their estates always lie near the "khalsa," or royal towns, which they are bound to protect, and which is in fact but looking after their

own property. They are not required to accompany the prince into the field.

3d.—The lands held by the religious orders are either given in "dhurum" or "sudawurt," that is, for purposes of charity or as a mark of favour. In the former instance they are not resumable, but can in the latter be recalled at pleasure. These lands in no way contribute to the maintenance of the state.

The Raja of Joodpoor derives no revenue from lands circumstanced as I have above described, but he retains a certain degree of supremacy over them, and brings all offenders to justice. The chiefs themselves have power of life and death on their estates, but it is a right which they do not exercise. Petty delinquencies are sometimes punished by them, but summary justice is often exercised on an individual caught in a deed.

Among the nobles of Joodpoor, several possess, by right of inheritance, the privilege of advising the prince in difficulty; these are at the head of the great Rhatore families, and are called "Shurayets" or "Oomras" of the kingdom. They are the chiefs of Pokrun and Awoh, Neembaj, Reean, Assobe, and Keeasir, or the heads of the Chumpawut, Oodawut, Meerteea, Koompawut, and Kurnote tribes.

The history of the nation is interwoven with that of these men; and the jealous eye with which they view their relative rank and the slightest infringement on their privileges, whether it be in points of importance or in the seats assigned to them at court, has been a fruitful source of difference. Lives have been sacrificed for the distinction of being seated on the right or left of the raja; and a chief of rank will not visit the court when another of his tribe is present to fill the family seat. These distinctions are still cherished by the chiefs of Marwar, with all the soul that actuated their heroic ancestors, but they are no longer associated with temporal authority in the state, for Man Sing receives the opinions of those most qualified to advise him, without reference to rank or right.

It is difficult to fix the portion of territory possessed by the chiefs of Joodpoor, but it is very considerable, and yields, it is said, a greater revenue than that of the state. At present, the chiefs are on friendly terms with each other, but this cessation of hostility arises from the iron hand of power. Man Sing, on his restoration, did not spare those who had been instrumental in confining him, many of whom had profited by that opportunity, and amassed riches. He seized the ministers of his son, stripped them of their wealth, butchered the most powerful nobles, and banished numbers from his kingdom. The chief of Neembaj, in particular, drew down his vengeance, but he had been one of the principal

advisers of the young prince. But prudence and policy required that these men should not be driven to despair, and he has lately reinstated most of the individuals. He, however, has seized lands from many of the younger branches, which has rendered him exceedingly unpopular with the Rajpoots. The raja gives out that these seizures are not to be retained as crown property, and by such measures he may hope to secure peace by holding out something in prospect to them.

Vigorous measures must ever be required in a Rajpoot country, where there are so many separate interests. The Rhatores of Joodpoor do not conceal their chagrin at measures so prejudicial towards them, and attribute their manifold disasters to the priests, or "Gooroos," who have secured such an influence over the minds of their ruler. Such invectives are to be received with caution, coming as they do from men who are smarting under despotism. That these priests have advanced their worldly ends by their intimacy with the raja, is evident, from the lands which he has bestowed upon them, but they must be men of rectitude and probity. A discontented or exiled chief will never approach the capital, even if invited to return, without a pledge of safety from them, and which, when given, has never been violated.

Man Sing insists on every chief who succeeds to his estate placing at his command a handsome "nuzr," or present; in return for investiture he claims also, at different periods, sums of money, to defray the exigencies of the state in the military department. If such demands are not complied with, he possesses himself of towns and villages, till the chief is brought to a sense of his duty.

The Raja of Joodpoor had, it must be confessed, a nice part to act, with regard to his nobles; his country had been long a troubled mass of intrigue, subject to the fury of the dissolute soldiery of Ameer Khan, whose greater influence over the fortunes of Marwar had led them to disregard the authority of their prince. The ascendency of the raja is now firmly established; and those who were ever ready to doubt and question his commands, now submit when called on, and hope for a restitution of lands when sequestrated by petitions, presents, intreaties and bribes, instead of trusting to the sword.

The subjection of the chiefs is complete, and Man Sing compels all of them to keep up the full complement of troops for which they have received their lands, which is advantageous to the state, and likewise calculated to cripple the resources of a turbulent race of men.

I shall now proceed to say something on the population of Joodpoor generally. There is a sameness in the inhabitants of

the states of Rajpootana, and I might transcribe much of what I have given in the preceding pages on Jaysulmeer.

The Banians in Joodpoor have great influence, in particular the "Singwees;" two men, Foujraj and Futtihraj, are the ministers; another individual of the same tribe conducts the affairs of the state with foreign powers, and one of them is even commander of the forces. No portion of the army ever takes the field without a Banian at its head; who, paradoxical enough, is the commander, but fights not. He is armed with spear, sword, and shield, but his religion forbids him to shed the blood of any thing living, and his province is to order and encourage the soldiers, combined with the settlement and adjustment of the expenses,—a system fraught with absurdity. I had an opportunity of seeing a detachment so situated, in pursuit of a body of Khosas, who had entered Joodpoor for the purposes of plunder.

The Rajpoots compose the bulk of the population, and, besides those of the Rhatore tribe, there are about ten thousand of the Bhattees, the race predominating in Jaysulmeer. Lakaphoolanee, one of the ancient heroes of Rajpootana, is always described in Marwar as a Bhattee.

The character of the Rajpoot is well known,—proud, haughty, vindictive, tyrannical, dissolute, indolent, and inattentive to business, not from want of capacity, but generally from intoxication. A Rajpoot state contains within itself, by the very construction of the government, the seeds of its destruction in the constant subdivision of the lands. This partition is a source of never-ceasing dispute. Instances daily occur of villages and districts lying waste and depopulated, for the feuds of the chiefs are felt by the body of the people.

Next to the Rajpoots in number are the Jhats, a tawny and powerful race of men, originally from Beecaneer and the countries westward of Delhi. They are said to have bound themselves to be the subjects of the Rajpoots, to whom, in common with others, they render a portion of the produce of the land. They are known in the country by the name of "Choudry," or "Zumeendar," and are an industrious race of men. There is one sect of them deserving notice—the Vishnuvee Jhats, or those who strictly adhere to the tenets of Vishnoo. These are from the neighbouring state of Beecaneer, and have many peculiarities: they neither take the lives of animals themselves, nor allow of its being done in their neighbourhood; they do not cut or lop the trees of their fields, in particular the "kejra," which they regard with especial care; nor do they destroy anything in the creation which it lies in their power to preserve. This creed is but novel in the country, and sprung up about four hundred and fifty years since, but its votaries have contrived to secure advantages from the state in reward for acts

of general benevolence. The Vishnuvee Jhats bury their dead, and have at their marriages a mixture of Mahommedan and Hindoo practices.

There is another tribe prevalent in Marwar, known by the name of "Sërgurra," whose employment consists in contributing to the noise which is so grateful to the Hindoo ear at marriages and ceremonies. They blow horns on such occasions; and when the Hindoo demigod, Ramchunder, is wrapt in sleep, and prevents, by the withdrawal of his countenance, the nuptial ceremonies, the "Sërgurras" are employed in agricultural pursuits. At all times they are bound to show the road to travellers, but are neither of the Bheel family nor of the most degraded orders of Hindoos. I have often had occasion to mark the shrewd intelligence of this race of men.

Among the hills which separate Joodpoor from Oodeepoor, there is a race of people called Mair, or Menah. They can neither be classed among the Hindoo nor Mahommedan faith; they have most lax principles of religion; they eat cows' flesh, and yet worship the Hindoo deities; and have been addicted, from time immemorial, to predatory habits, for which their mountains gave them facilities. In one respect they are like the Jews, a younger brother taking to himself the wife of an elder on his decease, though he may be already married. These people extend from the mountains of Aboo to Jeypoor.

The mercantile classes of Marwar are found in most of the great cities in India. There are settlements of them at Nagpoor and Aurungabad, also Poona, Bombay, &c.; nor do they betake themselves to these places that they may vend with advantage the products of their own country, but that they may advance their own interests, and procure a sufficiency to return and marry, which is their great object in life.

Bramins are not numerous in Joodpoor; their place is supplied by Charuns and Bhats.

The Mahommedan population is scanty, considering the vicinity of Marwar to Delhi, the seat of their once mighty empire. There are a few Mahommedans in some of the towns, but I have not seen any place in the country which exclusively belonged to them, and believe this portion of the population to be nearly confined to the mercenaries who compose the raja's army.

The natives of Marwar have a national uniformity to characterize them as one people in the party-coloured turbans which they wear. From the highest to the lowest this distinction prevails, those of the former being only more solicitous as to the brightness of the colours with which they surround their brows. This custom is believed to have had its origin in the time of the Delhi sovereigns, and by their desire.

If the standard of a country's wealth be estimated by the different kinds of grain which it produces, Marwar would stand conspicuous; it yields wheat, barley, gram, bajree, juwaree, mukkye, moong, and mut. In the northern parts they sow wheat and barley in the same field, and also barley with gram; the former is called "gooju," the latter "baijur," but neither of them are esteemed equal to wheat as food; they are cheaper. Moong and mut always grow together. As a country removed from the influence of running streams, there is certainly no part of India more productive, nor where the crops are so generally good as Marwar.

Joodpoor is not that arid and sterile soil which it has been represented; the country is intersected in almost every portion, particularly in the parts eastward of the capital, by rivers, or what should be more properly called torrents, which are dry in the fair season, but run with violence in the rains. These unite in one large trunk, which has received the name of Loonee, or the Salt River. It has its rise in the mountains of Ajmere, close on rivers that run in an opposite direction from itself and fall into the Bay of Bengal: it intersects the territories of Joodpoor in a diagonal direction, and enters the Runn of Cutch eastward of Parkur. The column of water which flows through the channel of this river in the rainy season is great, and it saturates its own banks and those of its tributary streams so effectually, that water is to be found throughout the year close to the surface. It is drawn to irrigate vast fields of wheat, which extend without intermission from Ajmere to the Runn.

The process of irrigation appears to me judicious, and less laborious than in other countries which have come under my notice. Water is generally raised by the Persian wheel, which is of the rudest manufacture, but has, nevertheless, decided advantages over the leathern bag, not the least of which is the saving of labour. It is distributed over the fields by aqueducts of earth, which sometimes extend for a mile in length, and are constructed with care and due attention to the level of the country. The wheat is sown after the rainy season has terminated, and is reaped in March. It does not require more than six waterings to bring it to maturity, but these are most copious, for a pair of oxen will only saturate a beega of land, which is twenty fathoms square, in twenty-four hours, and the fields are surrounded by dykes to prevent its egress. To the Loonee the country is indebted for the rich crops produced by these means. That river is the most remarkable feature in the Joodpoor dominions. The soil of Marwar is not, like the countries eastward, well adapted to the culture of opium, and were it more so than it is, the climate is not favourable for the extraction of that drug. The poppy is nevertheless reared in the

eastern parts of Joodpoor, in the district called Godwar, and under the hills which separate it from Marwar. It is of an inferior description, and therefore sold in its raw state, or with the poppies dried, by the name of "tijaru." It is to be had at a low price, and being mixed with water, yields an intoxicating liquor, the facilities for procuring which demoralize and debauch the lower orders of society. The Marwarees are all opium eaters, and the effects of the deleterious stimulant are visible in the inflamed eyes and premature old age of most of the inhabitants. Tobacco is produced in some parts of Marwar, but not in sufficient abundance to supersede the necessity of importation from Guzerat. There is great abundance of salt in Joodpoor, both at Sambre Lake and Punchpuddur.

The former town borders on the Jeypoor territory, and half of it belongs to it; Punchpuddur is on the Loonee towards Cutch. The mode of extracting the salt at the latter place differs from the common process of evaporation: pits of about one hundred and twenty feet by forty, and about ten deep, are dug in the saline soil, and a jungle shrub, called "murrooree," is then thrown in upon the water which exudes from the soil. This assists the crystallization and converts the water, in the course of two years, into a mass of salt, sometimes from four to five feet deep.*

The commerce of Marwar is extensive; its great emporium is Pallee, about forty miles south-east of the capital. It is the entrepôt between the western coast and Upper India—the channel by which the Malwa opium is exported to China and western Asia, and where the productions of nearly every country of commercial note in the world are collected. Merchants are to be found at it from all places of importance in India, and it carries on traffic with the countries westward of the Indus. The goods of Europe, packed in tin boxes, are brought to it by Guzerat, and generally landed at the bunders of Bhownuggur and Bombay, and sent inland on camels. Chintz, to the value of ten lacs of rupees yearly, are said to reach Pallee. The chief trade of the place consists in opium, and, for the last six years, the exports have never been less than fifteen hundred camel-loads, and more frequently two thousand. A camel carries ten maunds of forty seers, and the Pallee maund exceeds that of Bombay, which would give an annual export of from twenty to twenty-four thousand maunds. Till within these few months, opium was a contraband article at Pallee, but there was never any scarcity of it in the market. Since the road has been thrown open to it, on the payment of high duties, opium has decreased in value about a third;

* An account of the salt-works of Punchpuddur has been published by Lieutenant Burnes, in the Journal of the Asiatic Society of Bengal.

it is sent by land to Kurachee bunder in Sinde through Jaysulmeer, a distance of about five hundred miles, from which it is shipped for Demaun, and has a voyage of greater length by sea. The expenses of such a journey are very considerable; the Rajas of Joodpoor, Jaysulmeer, and the Ameers of Sinde, not only demand exorbitant duties for granting it a passage through their territories, but some of the minor chiefs also claim their tax: so excessive are the burdens levied on opium, that the merchants of Pallee generally consign the article for transport to men of the first opulence, who bind themselves, on the receipt of three hundred rupees for each camel-load, to deliver it safe at Demaun, uninjured by weather, plunder, or any other cause. Considering the inhospitable country through which the route lies before it can reach the banks of the Indus, and the great care which opium requires, the payment is not exorbitant. The Joodpoor government alone demands fifty rupees on every camel-load.

Besides the transit of goods to other countries, Marwar exports its own wheat in great quantities to Ajmere, Beecaneer, &c., where it is esteemed for its whiteness and superior quality. It has also most extensive dealings in salt, which is sometimes sent to Bengal, and is in general demand in all the upper parts of India. By the return camels from Sinde, Marwar receives the produce of that country,—rice, assafœtida, sulphur, &c.; from Lahore it has the shawls of Cashmere; from the Delhi and Jeypoor territories it has metals, cloths of wool and cotton, also sugar, From Cutch, by the seaport of Mandivee, it receives most extensive imports—the spices, cocoa nuts, &c. of Malabar; the staple of Arabia in great quantities—dates and dried fruits, with many other articles; it receives ivory from the eastern coast of Africa.

Marwar, as may be seen, owes much of its wealth to the transit of goods to other countries; and what speaks well for its ruler, this traffic has been only turned into its present channel within the last sixty years. In that time Pallee has risen on the ashes of many once flourishing towns to the eastward of it, such as Rutlam, &c., the routes by which are nearly forsaken. Even now there are no merchants of opulence actually resident at Pallee; their agents however reside in it, they themselves preferring the comforts of the larger cities.

The approach of the British government on Ajmere will probably be attended with disastrous consequences to Pallee and Marwar generally. By the mildness of the Company's government, and the increasing security of property, Ajmere has grown up into a beautiful and flourishing city of twenty-five thousand inhabitants, from the neglected and desolate state in which it was received from the Mahrattas in 1818. Many merchants, of the first consequence in Marwar, have now settled in it, as they can

there manage their affairs without fear of fine or punishment. Ajmere, too, has attractions of a high order to the Mahommedan and Hindoo; for, besides being the capital of a "soobu" of Delhi, it has within its walls the tomb of one of the most celebrated saints in Mahommedan India, and but six miles from its gates is the famous town of Pooshkur, or Pokur, where, situated on the margin of a lake, is the only temple dedicated to Brahma, or the Creator, in the Hindoo world. An ablution in its waters is believed not only to wash away the sins of the Hindoo, but those of the family he represents. To an unsettled people, like the mercantile classes of Marwar, great are the inducements to fix themselves in Ajmere; and that city in time, therefore, bids fair to be an ornament to the British rule in India—streets, squares, and bazars rise in it daily, and a general uniformity of plan has been maintained.* The devout Hindoo delights to expend his wealth on the temples and town of Pokur. This place is now both flourishing and populous, and, besides its numerous temples, there is more satisfactory proof of improvement in an uniform bazar, which has been lately finished by its Brahmins at the suggestion of the government, where a great and annual fair has been established, at which most extensive sales and purchases are made.

The resources of Joodpoor are considerable, even with the indifferent management of its officers, the Banians. The "khalsa," or royal lands, yield an annual revenue of thirty-seven lacs of rupees. Of this, ten lacs are allowed to support the ladies of the raja: a similar sum is also set aside for charitable purposes, such as supporting the Jogees and Brahmins, and keeping up "sadawurts," or daily distributions of alms at different towns in his territory; and the prince only retains about fifteen lacs for his own expenditure, though he has it in his power, it may be seen, to more than double that sum. A very eligible mode is followed in settling matters of expense, by assigning the revenues of different villages to certain fixed purposes: some, for instance, are appropriated to furnish milk for the household—others to the maintenance of the stud—some, again, to that of the camels; which must simplify the accounts of a government. The assessment in the different towns varies considerably. It is always made in kind. On the monsoon crops it ranges from one-third to one-eighth of the net produce, according to the distance of the place from the capital. On the frontiers, the amount is nearly nominal. The irrigated crops are more favoured, from the greater labour required in rearing them, and seldom pay more than one-seventh of the harvest. The duties

* The Honourable R. Cavendish, when Political Agent at Ajmere, took great interest in beautifying that city. I have here to acknowledge his good offices in enabling me to procure some of the information recorded in this paper.

on commerce supply a great portion of the revenue of Joodpoor. The town of Pallee alone yields, it is said, half a lac of rupees monthly. Like other native governments, these revenues are farmed chiefly to banians, who are continually changed according to the will of those in power at the capital. This system has many disadvantages, for these merchants, while in power, lose no opportunity of amassing wealth. The government is not ignorant of the fact, for the "hakims" (as the banians of districts are called) are constantly summoned to Joodpoor, and compelled, by confinement and punishment, to yield up their ill-gotten gains; but the subject participates nought in these spoils, and the banian, on recovering from his tribulation, is once more called to the court, honoured with a turban, and sent to some other district, where the same game is, in due course, repeated. The influence which these men possess is great: they manage the affairs of the raja, as well as of every chief.

Marwar is deservedly celebrated for its camels, to which it owes much of its rise in the scale of commerce among the surrounding people. There is no general mart for these animals in any one part of the country, but a few of them may be purchased at every village, from the rehbarees, or shepherds—the climate and productions of the country favouring their growth. The Marwar camel is of a brownish black colour, and capable of enduring great fatigue. They may be purchased at from fifty to sixty rupees a head, but those used as riding camels, or for carrying expresses, cost a greater sum. The hire of a camel for a hundred coss, or two hundred miles, is only eight rupees. Excepting the articles of salt and cocoa-nuts, the whole trade of Marwar is carried on by means of camels, many of the roads not admitting of the use of carts with convenience. The god of the Rhatores and of the Marwaree shepherds is named Paboo: he has his celebrity, in their eyes, from having introduced the camel into Marwar. This deified personage is said to have been formerly a Rajpoot, and is always represented by an equestrian image.

The bullocks of Marwar are held in high estimation on the western side of India. Those of Nagore, a town between Ajmere and Beecaneer, are the most celebrated. The cattle of Sachore are also superior. Pack bullocks are procurable without number. They are kept chiefly for the purposes of traffic between Cutch and Marwar, and for bringing the salt of Punchpuddur and Sambre to the market. Droves of some thousands may be seen passing the roads daily. The owners of these are the Charuns, who, while they derive protection from the religious order to which they belong, have additional respect and favour shown when of the mercantile class, which is held as honourable among them. These men have lighter duties levied from them, and are often

trusted with goods of great value. In their protection they will maim themselves, and even sacrifice their lives. They lead a wandering life, and always travel with their families and property. Asses are used in Marwar for the transport of salt. Goats and sheep are numerous, and furnish food of the best quality. The wool is not, however, prized as in the neighbouring countries of Beecaneer and Jaysulmeer. Pigs are reared in great numbers by the lower orders, but have more the appearance of the wild than the domestic animal.

The horses of Marwar did not strike me as good; the best are those of a cross breed with the Kattywar animal. The open nature of the country of Joodpoor frees it from beasts of prey; the tiger is confined to the mountains, but the less rapacious animals prowl over its plains.

Marwar contains within its limits about five thousand towns and villages. There are few large towns; but many, indeed most, of the villages, particularly those upon the Loonee and its tributary streams, are large and well peopled, and contain from five hundred to a thousand houses. Joodpoor is divided into twenty-four districts, which are generally named from the most considerable town in each; the boundaries of these are ill defined. The principal ones are Nagore and Meerta, north of the capital, and Sojut, Godwar, and Jallore to the south.

Joodpoor, the capital, is a walled city, built in a hollow, surrounded by rocky eminences, on which are three forts. The largest of these contains the palace of the raja, which is a most extensive edifice, and visible from afar. I have made very careful inquiry as to its population, and am persuaded that I do not overrate it at sixty thousand souls.

Pallee stands next in note to the capital, and has about fifty thousand people. It is an open town situated in a low and swampy plain, owing its wealth to its commerce. It was in former times a place of note in Marwar, and the residence of the Pallewa Brahmins, who first invited the Rhatore Rajpoots to settle in the country. It fell into a state of decay from Mahommedan oppression; from this it was rescued by an enterprising Banian, about sixty years since, who prevailed on the merchants of the neighbouring countries to remove to it. About a thousand mercenaries are retained for its protection, as it is, next to the capital, the most important town in Joodpoor.

Nagore, on the north-east, is a place of some extent, and famous for its manufactures in brass and iron. It is a walled town with a substantial fort within the city, and has a population of about forty thousand souls.

Meerta has been also a considerable place, but is now in a state of ruin. It has about twenty thousand people, and is known for its

chintz cloths, which are a coarse manufacture. There is a mosque at it, built by Amunzebe.

Next in importance to these places are Sambre, Pokrun, Peepar, Sojut, Jaitarun, Parbusir, Deedwana, Fullodee, Wallotra, and Ryepoor, all of a considerable size, and each having a population of about five thousand.

There are few forts or strongholds in Joodpoor, from the absence of hills, and scarcely any of the smaller towns are walled. Jallore and Seewannu are the most celebrated; both are hill forts; the former has about fifteen thousand people, and the fortification on the hill over it is the strongest place in Marwar. It is the state prison of the rajas of Joodpoor, where the turbulent characters or rebels of the state are confined; and it has been often the abode of the younger relatives of the reigning prince. The present raja, Man Sing, was besieged in Jallore for three years; and his success in warding off his enemies for so long a period was attributed to a Jogee, which is said to have induced his prepossession for that class of men.

Seewannu is built on a precipitous rock, about two hundred and fifty feet high, in a valley surrounded by hills. A detachment of two hundred men is generally kept here, for it is a place of some importance, and narrowly watched by the government. The works of the fort are inferior, but it has abundance of water. The town lies south of the fort, the only entrance to which leads through it.

Seewannu and Jallore are at the head of districts, as are all places mentioned in this paragraph, except Peepar and Wallotra. Sachore is the most southern portion of the Joodpoor dominions; but that district, and those in its vicinity, have never recovered the effects of the severe famine of 1813, which has left the country around thinly peopled and poorly cultivated.

Alex. Burnes.

VI.—*Geographical Memoir of Melville Island and Port Essington, on the Cobourg Peninsula, Northern Australia; with some observations on the Settlements which have been established on the North Coast of New Holland.* Accompanied by a Map of Melville and Bathurst Islands, and a Plan of Port Essington. Communicated by Major Campbell, 57th Foot, formerly Commandant at Melville Island. Read 12th and 20th May, 1834.

Very little correct local information on a most interesting part of the northern coast of New Holland and its neighbouring islands has yet been laid before the public, arising probably from the little attention that has hitherto been paid to this distant and not thoroughly explored portion of our British dominions, as well as

from the few opportunities that navigators or others have had of minutely examining its shores or interior. Many exaggerated, contradictory, and erroneous accounts have thus from time to time appeared, conveying but confused and unsatisfactory intelligence respecting that part of the world. And I have been induced, therefore, at the request of several friends interested in geographical science, to furnish what information on the subject I can, resulting from a residence of two years on this coast.

Experimental Settlements.—Two settlements were formed on the north coast of New Holland between 1824 and 1828, and subsequently abandoned. One of them was placed in Apsley Strait, in 1824, the other in Raffles Bay, in 1827; and the intention of their formation, with the causes which led to their being ultimately abandoned, being either little known or misunderstood, I shall first explain these points.

Previous to 1824, some masters of small trading vessels, who had been carrying on a traffic with the islands in the Indian Archipelago, found the trade they had thus embarked in of a description that promised a profitable market for European goods; and they also observed that several articles of traffic amongst these islands were obtained on the northern coast of New Holland, "such as *bêche la mer* or tripang, and pearl and tortoise-shell." They therefore naturally concluded that a British settlement on that coast might materially facilitate a commercial intercourse, not only with the inhabitants of the numerous islands in the Indian Archipelago, but also with the Chinese; and these observations, on being represented, meeting with a favourable consideration in the Colonial Department at home, and Government evincing an anxious desire to extend our trade in the Indian Seas, arrangements were soon afterwards entered into for carrying the views founded on them into effect.

Captain Bremer, C.B., (then commanding H. M. S. Tamar, and about to proceed from England to New South Wales on his way to India,) received instructions to take charge of an expedition which would be fitted out at Sydney, to proceed with it to the north coast of New Holland, and to establish a settlement on such part of that coast as he found would be most likely to answer the intentions of Government. The settlement established on Melville Island was the result, of the formation of which I shall now give a short account.

The materials being prepared at Sydney, Captain Bremer sailed from Port Jackson on the 24th August, 1824, having under his command (besides his own ship) two vessels, in which were embarked two officers and fifty soldiers of the third regiment, a surgeon, two gentlemen of the Commissariat Department, and forty-five convicts, with cattle and various stores. The expedition proceeded by the inner passage, through Torres' Strait, and

crossing the Gulf of Carpentaria on the 20th September reached Port Essington, where they came to anchor. They remained three days, but after searching in several directions for water, and being unable to discover any, except by digging holes in the sand at Point Record,* this circumstance induced Captain Bremer to look for a more convenient place more to the westward. On the morning of the 24th September, accordingly, Melville Island was seen from the mast-head, bearing S.W., and at seven P.M. the expedition anchored outside of the reef or shoal called Mermaid Shoal, which extends westward from Cape Van Diemen. The 25th was occupied by the expedition in threading its way through this intricate and extensive reef, and by half-past six in the evening, having cleared it, they anchored in seven fathoms water, off Bathurst Island. At daylight on the 26th they weighed and stood for the entrance between Melville and Bathurst Islands into Apsley Strait, and in the afternoon they anchored off Luxmoore Head in fifteen fathoms. (Luxmoore Head is a promontory of Melville Island, within the entrance of Apsley Strait.) The remainder of the 26th, the 27th, the 28th, and 29th, were occupied in searching for water, but none but what was brackish was found until late on the 29th, when a small stream was met with by Captain Bremer: this decided him to establish the new settlement in Apsley Strait, on the Melville Island side. The most eligible spot that presented itself was six miles higher up than Luxmoore Head; and on the 30th September the soldiers and convicts were landed, and the operation of clearing away ground on which to erect buildings was immediately commenced.

The spot fixed upon by Captain Bremer for the settlement was named by him Point Barlow, in compliment to Captain Barlow, 3rd Regiment, who was appointed Commandant; a low point of land to the N.W. of it was called Garden Point; and these two points formed the extremities of a small bay, which became the anchorage, and was named King's Cove. The beach around it, as well as to the S.E. of the intended settlement, was low, muddy, and lined with mangroves, and the higher grounds were covered with a dense forest.

By the 21st October, through the united efforts of the sailors, soldiers, and convicts, the settlement was in a great state of forwardness: and this being the anniversary of the battle of Trafalgar, Captain Bremer landed some guns and mounted them on the fort, which was now nearly completed; a royal salute was fired; and besides the names already mentioned, others were given. That part of Apsley Strait between Harris Island and Luxmoore Head was named Port Cockburn, and the work was called Fort Dundas.

* Named by Captain Bremer from the circumstance of having buried a bottle on the spot, in which was an account of his proceedings on landing at Port Essington.

On the 13th November, the fort, wharf, soldiers' huts, officers' houses, and commissariat store, being completed, also an excellent well thirty feet deep and six in diameter, and the provisions all landed, Captain Bremer took his departure for India, leaving an officer and thirty marines to assist in the protection of the settlement. The establishment at this time was as follows: Captain Barlow and Lieutenant Everard, 3rd Regiment; Lieutenant Williamson, Royal Marines; Assistant-Surgeon Turner, Royal Artillery; Mr. Miller, Commissariat Department; Mr. Tollemache, Commissariat Storekeeper; thirty soldiers of the Royal Marines; fifty of 3rd Regiment; and forty-five convicts. One small vessel of about sixty tons (the Lady Nelson) was also left for the purpose of being employed in procuring supplies from the island of Timor.

The first object—viz. clearing away a small space of ground to enable the settlers to erect huts for shelter, stores, and an hospital, in a country thickly wooded, surrounded by mangrove swamps, and under a burning sun—required no ordinary exertion; but by the perseverance of the military and prisoners, aided by the crew of the Tamar frigate, the fort was finished, a temporary wharf formed, and huts sufficient for shelter were constructed, in seventy-four days; subsequent to which and the departure of the Tamar, the convicts (forty-five in number) were the only labourers that could be employed in clearing away and bringing the ground into a state of cultivation, every other individual having abundant occupation to make himself by any means comfortable and secure. As the huts were unavoidably erected close to the standing timber, the natives, who constantly hovered through the forest, were extremely troublesome, frequently throwing their spears into the huts and hospital; scurvy and ague also soon appeared, and, diminishing the number of workmen, retarded exceedingly the operation of clearing; and the difficulties experienced in communicating with Sydney occasioned other drawbacks, as will in the sequel appear.

From the great distance between Melville Island and Sydney, and the total want of any direct intercourse, very little was known about the settlement even in July, 1826. Towards the end of 1825, one set of despatches reached Sydney, which had been sent *viâ* Batavia or India; and these did not convey a very favourable report of the new settlement, the Commandant having experienced many unexpected difficulties, the principal of which were, want of fresh provisions and vegetables; inadequate materials for carrying on field labour; scurvy, and a great deal of sickness; several deaths which had taken place; the loss of the Lady Nelson, which was sent for supplies to the island of Timor, in February, 1825, and never afterwards heard of; and also of a schooner called

the Stedcomb, which the Commandant had engaged, in place of the Lady Nelson, to procure buffalos from Coëpang Timor, and which sailed from Melville Island in February, 1826, and never returned, having been taken by pirates off the east end of Timor. The settlement was thus left without fresh meat or vegetables, which latter could not be produced in sufficient quantity; and scurvy thus broke out, and raged for many months in a very alarming degree. Supplies of flour, pickles, and preserved meats were afterwards sent from Sydney, in the ship Sir Philip Dundas which reached Melville Island in the beginning of 1826; and another vessel (the Mermaid cutter), despatched from Sydney in March 1826, arrived at the settlement on the 5th August. These delays and losses occasioned not only great impediments to the improvement of the settlement, but left the Governor of New South Wales in much anxiety respecting it.

At the beginning of August, 1826, his Excellency Lieutenant-General Darling, then Governor of New South Wales, was pleased to appoint me Commandant of Melville Island, and directed me to embark on board the Colonial schooner Isabella, with a detachment of troops, some convicts, and various stores, as well as live stock, and to proceed with all despatch through Torres Straits to relieve Captain Barlow and his detachment. On the 19th August we left Port Jackson, and reached Melville Island on the 19th September. The officers and men who had formed the settlement, and had been there about two years, were rejoiced to find that a relief had arrived for them; they gave us a discouraging account of the oppressiveness of the climate, the scarcity of vegetables, the deficiency of fresh meat, the almost impossibility of procuring fish, the dreariness of the situation—(never having been visited by any other than the two small colonial vessels already mentioned as sent from Sydney with supplies, by a man-of-war's boat, which came in for a few hours, whilst the man-of-war, the Slaney, remained outside the reefs, about eighteen miles off; and I believe also that H. M. ship Larne had touched there)—the hostility of the natives, and many other mortifications which conveyed but a gloomy picture of the settlement. I was, however, fortunately not of a temperament to be cast down by these accounts; but on the contrary rejoiced that I had been placed in so novel and interesting a situation, and looked forward with a pleasing anticipation that patience, exertion, and industry would soon bring the settlement to answer the intentions of Government in having formed it.

As the views of Government in wishing to establish a commercial depôt have been already mentioned, and two years' trial had now been given, certainly with very limited means, I shall here state such observations as I made immediately after my arrival,

and introduce the substance of my first report to his Excellency the Governor of New South Wales.

The number of persons landed at the settlement in 1824 amounted to about one hundred and twenty-six; and during the period of two years which elapsed before my arrival, eight soldiers and four convicts had died, but two of these had been drowned, and one died in consequence of spear-wounds received from the natives.

The appearance of the military and prisoners (although their complexions were sallow) was that of health; and from the statement of Dr. Turner I formed an opinion that Melville Island could not be called very unhealthy, and that the salubrity of the climate, with common precaution, was by no means inferior to most under the same parallel.

The amount of population, after Captain Barlow sailed, was as follows: one hundred and fifteen males, fifty-four of whom were prisoners, and six females, besides fourteen sailors on board of ship. The live-stock consisted of sixteen head of horned cattle, twenty-three sheep and lambs, and fifty-four head of swine, (all kept exclusively for breeding;) besides which, sixteen buffaloes for slaughter had just been landed from Timor. Of land cleared of timber there were fifty-two acres, three of them cultivated; and ninety-five acres on which the timber was felled, but not cleared off. The buildings consisted of three wooden houses for officers, one for soldiers, one for an hospital, two store-houses, thirteen huts for the prisoners, and seven for the Royal Marines. The huts were in general miserable hovels, constructed hastily and irregularly.

In looking about the settlement, things appeared in a more backward state than they should have been after an occupation of two years; but this was owing to the scarcity of workmen, the total deficiency of any draught animals, and the want of good mechanics. The gardens were very backward; there not being any competent person to attend to them until a few weeks previous to my arrival. The soil near the sea was very rocky and difficult to the spade, and on this ground a government garden was marked out in 1824. Melons and pumpkins grew well in it, and where there was any depth of soil it was found to be good, and all seeds planted there sprung up quickly; but what Nature did for them was counteracted by an incapable gardener.

The Malays had never been seen near Melville Island, nor had any vessel visited it up to the present period, excepting the English men-of-war and government colonial store-ships already mentioned.

The approach to Apsley Strait was intricate, attended with danger, and required much caution, in consequence of extensive

reefs, strong currents, and sand-banks, which embarrassed its entrance, and of which I shall speak more fully in another place; but I then thought it might be rendered safer by means of buoys.

Melville Island is situated between the parallels 11° 8′ 30″ and 11° 56′ S., and extends west and east from longitude 130° 20′ to 131° 34′ E. It lies off the north coast of New Holland, from which its eastern end is distant fifteen miles. The sea between Melville Island and the main was named Clarence Strait by Captain King, and is studded with small islands, rocks, and reefs, between which run rapid currents. It is five degrees to the westward of the Gulf of Carpentaria.

The most northern and western point of Melville Island (Cape Van Diemen) is three hundred and thirty miles distant from the island of Timor, the centre of which island bears W.N.W. from it; and the Dutch seat of government at Coëpang is four hundred miles distant.

The extreme length of Melville Island from Cape Van Diemen to Cape Keith is seventy-five miles; and its breadth, from Cape Radford on the north side, to Cape Gambier on the south, is thirty-seven. The surface of the island is low and gently undulating, averaging from twenty to seventy feet above the sea; but there are a few small elevations towards the southern side, of probably two hundred feet height.

Melville Island is separated from Bathurst Island by a strait, varying from four miles to one and a half in breadth, and forty-six miles long. This strait is called Apsley Strait. Bathurst Island is of a triangular shape, each side measuring about forty miles. Its surface and its productions are similar to those of Melville Island. The northern line of coast of Melville Island and the north-western side of Bathurst are generally low and lined with mangroves. The eastern, western, and south sides are more elevated, and sometimes abrupt, forming cliffs or clay banks. Both those islands are well clothed with wood, presenting one mass of dark green foliage, excepting at the western end of Bathurst Island, which is sandy, and of a barren aspect,—the trees being scattered and stunted from exposure to the strong blast of the north-west monsoon.

In October, 1827, I examined the north coast of Melville Island, hoping to find some good harbours, or a more eligible situation for the settlement than Apsley Strait proved to be; but the whole line of this coast I found lined with an almost continued barrier of mangroves, except a few places where there were abrupt banks, twenty feet high, of a red ferruginous clay; the bays were all shallow, exposed to the north and north-west winds,

unfit for anchorage for any other than small craft or boats; and the heads of these bays terminated in salt-water creeks, surrounded by thick belts of mangrove. I observed two fine abrupt sand beaches towards the eastern end of the island; the one extending from Lethbridge Bay to near Smoky Point, and the other extending from Brenton Bay to near Point Jahleel; both face the north-west, and are a great resort of turtle.

As the commanders of those vessels that visited the settlement during my command remarked on the great difficulties of the entrance into Apsley Strait, many of them, although several times in the strait, having frequently touched on the rocks or shoals, and been sometimes, in calms, driven or drifted by currents to the southward of the island; and as I possessed no chart of the whole of Apsley Strait, or even of these islands, I determined on surveying the whole, particularly examining the southern end of the Strait, which had only been once before approached by any vessel (that of Captain King, in 1818); and I hoped that by finding a safe entrance at that end the prospects of the settlement would be materially improved.

In March, 1827, I entered upon this survey, taking the basis of my operations from Garden Point,—the exact situation of which had been carefully fixed, in 1824, by Lieutenant Roe, of H. M. S. Tamar, who also had surveyed and drawn a good chart of the northern end of the straits. The result of my survey, which occupied nine days, was as follows:—From the settlement to within seven miles of the sea at the southern end of the straits, (a distance of thirty miles,) the channel is safe and deep enough for any vessel; but at seven miles within the entrance of the straits, commencing at an inlet named Medina, I found the passage intricate and dangerous, the channel narrow, and winding between sand-banks and coral reefs, which are covered at half-flood, some dry at low water, and others having then half a fathom water upon them. These dangers first appear in a circular basin (which I named Shoal Basin) near where Captain King anchored and terminated his attempt to pass through the straits in 1818. The mouth of the strait is about three-quarters of a mile wide, having seven fathoms water in mid-channel; it opens into a wide bay, which at high-water appears to be devoid of any danger; but at half-tide extensive sand-banks are exposed and extend almost entirely across and around the bay, leaving a very narrow and winding channel on the eastern side, varying in depth at low water from ten to two fathoms. This bay is three miles wide, and at low water there is no perceptible passage to the open sea, the sand-banks extending seaward as far as the eye can reach. It was at the time of spring tides that I was there, and the water rose and fell fourteen feet; the tide ran at the rate of five miles an hour.

In the chart I have named this bay Shoal Bay; it is in lat. 11 48′ South, and long. 130° 43′ East.

I remained two days outside of the southern entrance sounding, and endeavouring to find a passage out to the open sea; but the sand-banks were so numerous, and the winding channel through them so narrow, with the soundings irregular, that I was obliged to desist. I was moreover limited with regard to time, and as I had neither a chart nor chronometer to assist me in making a quick return to the settlement round Bathurst Island, or by the eastward through Clarence or Dundas Straits, round Melville Island, as I had intended, (provided I could have got easily out,) I was most reluctantly compelled to return, disappointed in my hopes. I landed and examined a small low island that is situated in the bay outside of the strait: from the flock of pelicans seen upon it I named it Pelican Island; but, upon subsequent reference to Captain King's chart, I found that it had already been designated one of the Buchanan Isles.

Both Melville and Bathurst Islands, which form the strait, present the same unvaried and gloomy appearance throughout. The land is invariably low, intersected by swamps in the lowest parts, and the higher ground is one continued forest. The shore, from one end of the strait to the other, is bordered by a broad belt of impenetrable mangroves, and indented by numerous salt-water creeks, which present the appearance of rivers; the upper part of these creeks generally terminating in salt marshes, through which drain small streams of water, which is thus brackish even when the tide is out. Some of these creeks stretch inland seven or eight miles.

Mermaid Shoal.—During my residence on Melville Island, I thrice examined the Mermaid shoal which had occasioned great embarrassment to vessels approaching Apsley Strait.

This shoal extends eighteen miles in a westerly direction from Cape Van Diemen, and, I believe, was named by Captain King after the vessel he sailed in, when surveying the N. and N.W. coast of Australia; and its probable boundary is laid down in that officer's excellent chart. Commencing from Cape Van Diemen, it runs out in a northerly direction five miles; its northern boundary then trends away W.S.W. nearly eighteen miles. At the western end there is a sand bank running S.E. and N.W., about seven miles long, and sometimes visible at low water, which is separated from the rest of the shoal by a narrow channel, in which the depth of water is very variable in consequence of frequent overfalls of the ground; and the tide runs very rapidly through it. At half flood I found the soundings vary as follows, viz.: 10, 7, 5, 3, 10, 4, 7, 6, 8, 9, 10 fathoms. Between this channel and the coast, extending from Cape Van Diemen to

Piper's Head, the shoal consists of clusters of coral rocks. The southern side projects in a S.S.W. direction from Piper's Head, entering about a mile and a half into St. Asaph's Bay, and thence runs N.N.W. to within a mile of the sand-bank already mentioned. A shoal also runs out in a N.W. direction from Point Brace, (the western point of entrance to Apsley Strait,) extending to the northward of the point two miles and a quarter, and to the westward five miles and a half. The outward border of this shoal is two miles distant from that of the Mermaid; and if a vessel entering or going out of Apsley Strait keeps in mid channel, it will have good soundings from eight to twenty fathoms; but near the shoals on each side the soundings rapidly alter; perhaps in two successive heaves of the lead, from nine to six and three fathoms, thereby requiring very great caution. Further, from the frequently muddy colour of the water it is difficult to distinguish the immediate vicinity of the shoals. In boisterous weather the winds and currents together cause such a broken and agitated sea all across the channel, that it would be very dangerous for any ship to venture through in such weather.

The anchorage in King's Cove, although ten miles within the straits, is not at all times secure. The bottom is soft mud, with the ground rising rapidly towards the shore, and strong currents sweep round the cove; in squally weather, therefore, with the wind off the land, vessels are liable to drag their anchors. The Mermaid, Isabella schooner, and the Lady Nelson brig, did so at different periods.

Reef between Cape Fleeming and Point Jahleel.—It may also be considered relevant, that I should mention a dangerous reef which lies off the eastern end of Melville Island. I presume it was observed by Captain King, but I am not aware that it was particularly remarked; and I was ignorant of its existence until I found myself hard and fast upon it through the carelessness of the mate upon watch, as I was proceeding from Melville Island towards the Cobourg Peninsula in 1827. Our bearings were then as follows:—

1st. Point Jahleel bore W. by N. six miles and a half distant.

2nd. The most distant point to the S.E., supposed Cape Fleeming, bore S.E. by S. four miles.

3rd. The nearest land, named by me Point Dowset, bore S. ½ W. three miles and one quarter.

4th. A point on the eastern side of a deep bay, (named Disaster Bay in my chart,) bore S.W.¾W. four miles distant.

From the appearance of broken and light coloured water, the reef appeared to extend between three and four miles in a crescent form, and in detached patches, the convex side facing the eastward.

The interior of Melville Island is very difficult of access, in consequence of almost impenetrable mangrove-swamps and close forest; and in my several excursions into its interior, for the purpose of surveying and penetrating in direct lines from the coast, I found the features of the country always similar. From the closeness of the trees and want of elevated spots, I could seldom see beyond three or four hundred yards, and my movements were always guided by compass.

When seen from the sea the island has a pleasing appearance in consequence of its gently undulating surface and being thickly wooded; but when on shore its beauty vanishes, a monotonous succession of salt-water creeks, mangrove-swamps, and forest, (the trees of which are generally of the same appearance, having long bare trunks and very scanty foliage,) speedily surfeiting the most ardent admirer of the beauties of nature.

The elevated ground sometimes runs in narrow strips and at others extends widely; the slopes generally terminate in a swamp, but yet sometimes they have open spaces of arid flat ground at their base, of from fifty to a hundred acres in extent, covered only with low shrubs and thin coarse grass. Here and there are also plains of dry mud without any vegetation. The surface of the elevated ground is very stony, being covered with small shining masses of ironstone, having a metallic lustre, as if they had been ejected from a furnace. The sloping sides are less stony, and the flat ground is generally quite free from stone. Streams of water are scarce throughout the island, but the swamp water is generally drinkable; and by sinking wells a constant supply of excellent water is obtained. The swamps are generally full of long grass and reeds, intermixed with small trees; and leading into these swamps are narrow gullies choked up with a kind of cane or ratan, (*Flagellaria indica*, Linn.) Excursions into the interior are attended with excessive fatigue and much risk, the leading causes of which are the oppressive heat experienced in the close forest, where the air is seldom in motion; the myriads of sand-flies which infest and torment the traveller whenever he stands still or rests for an instant, and the constant alertness demanded to guard against the hostile natives.

Soil and Productions of Melville Island.—After four years' experience, we found the soil of Melville Island in general to be of an inferior quality, partaking of the character of the ironstone which is so generally diffused over it. The subsoil, after digging two feet and a half, is much better, being a brown mould of a saponaceous texture. This is the character of the soil on the elevated ground at a little distance from the shore; close to the shore it is very rocky, and the rocks are generally of a ferruginous nature, heavy, brittle, and splintery in the fracture; the soil

is light and shallow, intermixed with much sand and gravel. Bordering on the swamps, it is richer and more productive, but sometimes so dark in colour (almost black) that, by attracting the heat of the sun, it burns up the vegetables which it had quickly produced. After digging a few feet below the surface, the ground is frequently found to be of a whitish clayey nature. There are many flat pieces of ground near the swamps which I think capable of producing rice; but we had neither the means nor the opportunity of trying experiments with that grain; and the results of our trials of the productive qualities of the soil, generally, will be found afterwards.

The vegetable productions indigenous to Melville Island are various and abundant, vegetation being certainly altogether very luxuriant, and during the whole year there was plenty of grass for the subsistence of our cattle. The timber is in general of a useful quality; and although trees which are small in the stem predominate, yet there are many of considerable dimensions and applicable to house-building, furniture, ship and boat building, and to agricultural purposes. The largest timber measured sixty feet of stem, and three feet in diameter; and the average number of trees to an acre is about one hundred and twenty, but sometimes they are more numerous, amounting to one hundred and eighty. At a distance from the swamps, there is but little underwood; but in their neighbourhood, and generally on all the low ground, the sago palm (*Cycas media,* of Brown), the fan palm (*Livistona inermis*—Brown), the grass palm (*Pandanus spiralis*—Brown), and the cabbage palm (*Seaforthia elegans*—Brown), are thickly intermingled with the more lofty timber. Amongst the forest trees, several species of eucalyptus are most abundant.

Although the timber, as I have already stated, is both abundant and good, yet one-third or fourth of the trees are frequently rendered useless from the depredations of the white ants; which excavate the interior of a tree from one end to the other, forming a tube from three to five inches in diameter; and even the hardest wood, such as lignum vitæ, does not escape them.

During my residence on Melville Island we tried twenty-five varieties of wood, of which I shall here insert a list; at the same time showing the uses to which they were applied, with their dimensions and qualities. As most of them were of a species unknown to any of the colonists (none of whom were botanists), the nomenclature was formed either from the colour of the wood, structure of the bark, form of the leaf, or locality of the tree; and samples of all of them are in the writer's possession.

List of Timber found on Melville Island.

Colonial, or Common Name.	Botanical Name or Species.	Locality.	Length of Stem.	Diameter.	If plentiful or otherwise.	When in Blossom or Fruit.	Quality of Wood.	To what purposes applied.
No.			ft. ft.	in. in.				
1. Nutmeg	Myristica insipida, Br.	Swampy ground	20 to 40	8 to 12	Abundant	May	Soft	Timber little used, as it soon decays.
2. Eucalyptus	E. miniata, C.	Dry land	20 to 50	20 to 36	Ditto	March	Hard	For girders, scantling, and weather boards.
3. Alspice		Near the swamps	2 to 20	6 to 12	Ditto	Ditto	Soft	Wood never used.
4. Red Apple Tree		Sandy soil	12 to 40	8 to 12	Plentiful	Fruit in Nov.	Fine grain	For cabinet work.
5. Swamp Wood		Swamps	12 to 30	8 to 12	Ditto	April	Soft	Used for planks, but subject to worms.
6. Lignum Vitæ		High land	20 to 50	12 to 36	Ditto	Unknown	Hard	Block-sheeves and treenails.
7. Brown Wood		Ditto	12 to 16	18 to 20	Ditto	Ditto	Close grain	Scantling, planks, and boat timbers.
8. Teak, or Yellow Wood	Acacia, sp.	Close to swamps	20 to 60	12 to 36	Ditto	May	Close & hard	Furniture and boat-building.
9. Blood Wood		Forest land	20 to 60	10 to 20	Ditto	Unknown	Ditto	Treenails, scantling, and shingles.
10. Red Bark, with narrow leaf		Ditto	20 to 60	10 to 20	Scattered	Ditto	Hard	Ditto, ditto.
11. Brown Turpentine Wood		Ditto	20 to 40	7 to 12	Plentiful	March	Ditto	Scantling and weather boards.
12. White Turpentine Wood		Near swamps	20 to 30	12 to 24	Ditto	Ditto	Coarse	Planks; but soon decays.
13. Cherry Wood		Ditto	12 to 30	12 to 20	Ditto	Fruit in Dec.	Fine & hard	Fit for any purpose.
14. White Apple Tree	Eugenia, sp.	Ditto	12 to 30	12 to 20	Ditto	Ditto	Tough	House and agricultural purposes.
15. Large Swamp Wood		Swamps	20 to 60	12 to 36	Ditto	Unknown	Soft	Planks; but soon decays.
16. Plum Tree*		Forest land	3 to 10	6 to 12	Scarce	Ditto	Hard	Joiner's work.
17. Swamp Elm		Swamps	15 to 30	8 to 12	Plenty	Ditto	Soft	Ditto
18. Red Bark, with broad leaf		Dry forest land	15 to 20	9 to 12	Scarce	Ditto	Hard	Ditto
19. Swamp Ash		Swamps	15 to 50	9 to 20	Ditto	Ditto	Soft	Planks and Scantling.
20. White Border Wood †		Near to swamps	15 to 40	9 to 20	Plenty	May	Ditto	Ditto, ditto.
21. Cotton Tree ‡		Do. and on high land	15 to 30	9 to 20	Ditto	Ditto	Rather hard	Ditto, ditto.
22. Variegated Bark		Swamps	15 to 30	10 to 14	Scarce	Fruit in Nov.	Soft	Ditto; but subject to worms.
23. Cypress Pine	Callibris, sp.	Rocky ground	12 to 20	6 to 22	In Clumps	Seeds in Sept.	Brittle	Close-grained, and used for box and cabinet-work.
24. Blue Gum		Forest land	15 to 40	10 to 24	Not plenty	Unknown	Hard	Every kind of coarse work.
25. White Swamp Wood		Swamps	20 to 40	10 to 36	Plenty	Ditto	Soft and fine	Window-sashes and blinds.

* Plum tree—named from the structure of the wood being similar to the English plum tree. † Named from its growing on the borders of swamps.
‡ Produces a pod, the size of a large hen's egg, filled with short coarse cotton.

The only trees we met with, producing an edible fruit, were two species of apple and a plum; one of the apples was very acid and astringent, and only palatable in tarts or puddings; the other two fruits, though pleasant to the taste, were not much indulged in for fear they might prove pernicious.

Grasses are abundant, and grow very rank, some of them being very injurious to the cattle; but the greater proportion are wholesome and nutritive, and the cattle, when once acclimatised, thrive well upon them. Cattle, sheep, and goats, when first landed upon Melville Island, suffer very much, either from the grass, water, or climate; I cannot decide which—probably a combination of all three. During the first three years of the settlement, two-thirds of the cattle died in ten or fourteen days after being landed. The cows which survived this trial afterwards did very well; but sheep never fattened; they, however, produced fine lambs, and these, as well as the produce of the cows and goats which escaped the mortality on first introduction to the island, continued afterwards to thrive well. In 1827, we adopted a new plan of managing the cattle when first landed, and the deaths were in consequence much decreased.

The grass preferred by the cattle was that which grew on the borders of the swamps and the young grass around fallen timber; but the fine-looking grass on the forest land they avoided: of this we, however, made tolerable hay. We tried several exotic grasses, which succeeded very well; particularly the Capeen and Caffer grass.

Besides the forest trees already enumerated (and which are for the most part evergreens), there is a great variety of ornamental trees, shrubs, and flowers, which give some liveliness throughout the year to the otherwise sombre appearance of the island; amongst them, the abiscus, casuarina, convolvulus, the bead vine (*Abrus precatorius*—Linn.), and other runners and parasitical plants, are very conspicuous. The loranthus, with scarlet flowers, abounds; as also the beautiful calythrix (*C. microphylla*—Cun.), bearing a pink-coloured flower*. Of the flowers most numerous and beautiful, are the following:—*Crinum angustifolium*—Br.; *Calostemma album* — Br.; *Ipomœa pes capræ*, with pink flowers; *Plectranthus salicifolius*, with purple flowers; a *Dendrobium*, with white flowers, &c.

Some of the mangroves grow to a considerable height, and the mangrove holly (*Acanthus ilicifolius*—Br.) is very frequent in their neighbourhood. In the forest land, trees producing a gum or rosin are numerous; this gum, exuding from the bank, forms lumps upon the stem, and is much used by the natives in the

* Shrubs of the genus *Persoonia* are also frequent.

formation of their spears. I can say but little of the esculent roots indigenous to Melville Island: there is a root of a small yam-like appearance, and another resembling a parsnip, both of which were scarce; and as they were only met with when better-known vegetables became tolerably plentiful in the gardens, I do not know that any trial was ever made of them, and we had never any opportunity of ascertaining whether they were used by the natives or not. The only vegetable production we observed them to eat was the young flower-branch or leaves within the spathæ of the cabbage palm, with the seed of the sago palm. The former was frequently made use of at the settlement, and a most acceptable vegetable it was when boiled or stewed. The cabbage palm grows to a great height (sometimes thirty feet), and latterly we obtained the germ, or rather the flower-branch, by ascending the tree and cutting it out with a strong knife or tomahawk; but, at the commencement of the settlement, many palms were altogether cut down near the root, and they consequently became scarce in the neighbourhood of Fort Dundas, though we frequently found clumps of them seven or eight miles from us. A large bean* is also met with in sandy places, and particularly near the shore; but when cooked and made use of, it was apt to occasion pain and a looseness of the bowels.

The first settlers reported that cloves and nutmeg were indigenous in the island, but this was altogether a mistake; and the nutmeg-tree (*Myristica insipida*—Br.), which I observed growing both close to and in the swamps, produced a small nut very slightly pungent, scarcely three-quarters of an inch long, but egg-shaped, and the mace, or net-work enclosing it, devoid of flavour. Some people have also been led to believe that sandal-wood was indigenous in Melville Island; but this is also an error, as the wood mistaken for it was the cypress pine, a species of *Callitris*, which resembled the sandal-wood in colour, and had somewhat of its pleasing smell. Wild ginger is however indigenous in Melville Island.

Quadrupeds.—Having stated all that I at present recollect under the head of indigenous vegetable productions, I shall now mention those of the animal kingdom. Of four-footed animals, we had the kangaroo, opossum, bandicoot, native dog, a small brown rat, a species of squirrel, and an animal very destructive to poultry, with a sharp nose, and the body covered with dark brown hair: the tail is fourteen inches long, and bare, like that of a rat, excepting within three inches of the tip, which is covered with long white hair; it measures twenty-seven inches from the extremity of the nose to the tip of the tail. The Ternate bat, or

* *Bauhini microphylla.*

flying fox, (*Vespertilio vampyrus*—Linn. *Pteropus Edwardsii, Desmarest. Mamm.*) is very numerous in the vicinity of the creeks, and flies about or suspends itself to trees in flocks of several hundreds together: those which I procured measured ten inches in length of body, and three feet between the extremities of the outstretched membrane. Of all the animals I have mentioned, only two of them were used by us as food; viz., the kangaroo and bandicoot; the former we seldom got, as they resorted to situations at too remote and inconvenient a distance to admit of our hunting them. The bandicoot afforded good eating, and were found generally, on moonlight nights, concealed in the hollow trunks of decayed trees.

Birds.—Of the feathered tribe there is a great variety, and of the most beautiful plumage; amongst them I may enumerate the following: white cockatoo, with yellow crest; black cockatoo, with red crest and red at the extremity of the tail-feathers; seven varieties of peroquets; six varieties of pigeons; four kinds of king-fisher, and amongst them the gigantic king-fisher (*Dacelo gigantea*—Leach); swamp pheasants (*Centropus phasianus*—Ill.); quail; curlew; wild ducks; sand-larks (seen in flocks in November); wild geese (rare); and a wild black fowl of the gallinaceous order, weighing from three to four pounds, and found in packs amongst the long grass near swamps, the flesh hard and insipid; blue and white cranes, and several more of the genus *Ardea*. There are magpies, ravens, hawks, owls, and wattle-birds; and many beautiful small birds are also abundant.

Reptiles.—Amongst the class reptiles, we found a great variety of the snake tribe, measuring from one foot to twelve in length: they were met with everywhere—in the forest, swampy ground, and houses. Although several of the soldiers and convicts were bitten by them, none of the wounds were very serious, excepting in the case of one man (the overseer), who was bitten by a snake whilst in bed. The reptile took a piece of the flesh clean out of his thigh; and as there was no medical man on the island at the time, Lieutenant Bate (who was superintending the sick, and was immediately informed of the accident) burnt the wound all around with caustic, instead of cutting any part away. The man suffered considerable pain for some days, and experienced many of the sensations felt by those who have been bitten by venomous reptiles. He was confined for ten days from the effect of the bite. The snake was found on the following morning in the overseer's hut, coiled up under a box. It was immediately killed, and burnt upon a fire before I had an opportunity of examining it. It was described to me as being six feet long, with a broad head and small neck. Another snake was brought to me which had bitten a dog and drawn blood. It measured ten feet

in length, had a broad, flat head, and small neck. It was furnished with a double row of very sharp teeth: the fangs were curved, and measured three-quarters of an inch in length, and a small bladder was attached to the root of each. The back was of a dark mottled brown colour, with a white belly. Although this appeared to be a venomous snake, yet the dog never suffered from the bite. This I attributed to his long hair preventing the poison entering the wound.

The Saurian order are very numerous, the most remarkable being the frilled iguana, or *Clamydosaurus Kingii* of Gray. The common iguana (*Iguana delicatissima*), from two to four feet in length, also abounds.* The skink-formed lizard (*Telequa tuberculata*, Gray) is met with in stony places; and an endless variety of the smaller lacertæ, of beautiful colours, are seen wherever the eye is directed, sporting in the sun, and cunningly waiting to entrap any unsuspecting insect that ventures near. Frogs of an immense size (four and five inches in length of body, and prettily spotted) swarm in damp places.

Apsley Strait, and all the creeks around Melville Island, abound with alligators (*caimans*). They measure from fourteen to seventeen feet in length; and in the clear water around the island, are frequently seen water-snakes, two and three feet in length, and spotted black and yellow. Turtles are common on the sea-coast of Melville Island, but they were never seen in Apsley Strait, and we of consequence were never able to obtain any for the use of the settlement. Our limited number, and necessary occupations at the settlement, deprived us of the power of sending parties to any such distance as would detain them beyond twenty-four hours. Even to procure a few fish, we were obliged to send ten miles from the settlement, to the nearest fishing-ground; and owing to the strong tides and currents, and the fishing time being that of half flood, a party, after drawing the seine as often as it was attended with success, could seldom return under twenty-four hours; and in so warm a climate, the few fish they caught were by that time scarcely fresh enough to be eaten. I have been on these excursions all night, exposed to heavy rain, for the purpose of obtaining a change of food for those intrusted to my care, and have returned with probably only about eighty or one hundred pounds weight of fish, for the supply of one hundred and thirty individuals. Although, as I have already stated, we were never able to take turtle, yet I have seen them swimming about in considerable numbers off Brenton Bay, near Point Jahleel.

Insects.—To the entomologist Melville Island offers an ample

* These iguanas burrow like rabbits underground, and their holes are so numerous in the light sandy soil of the forest, that it requires considerable caution to avoid falling in to them.

field for observation. The species are both numerous and beautiful; and the vicinity of the swamps would afford the insect collector an abundant harvest. The orders hemiptera and lepidoptera are particularly beautiful, and in great numbers, and that of coleoptera is also found abundant in species. Of the order neuroptera, the libellula, or dragon-fly, is in great variety and beauty; and I have seen five kinds of ant, chiefly of the genus termites: viz., the white ant, which rears its pyramidal dwelling to the height of seven or eight feet; the green ant; red and black ant; large black ant; and a very minute ant, that can scarcely be discerned with the naked eye. The white ant infests the houses, and destroys everything that comes in its way. These insects make their approach by forming an earthen gallery, under cover of which they advance in myriads, and commit terrible depredations. They cut through all bale goods in our stores, such as canvass, blankets, shirts, trowsers, and even shoes. They are so rapid in their operations, that I know instances where bales, containing two dozen of shirts each, each shirt packed one above the other, and placed on shelves four feet from the floor, and six inches from the wall, have been perforated through and through in twenty-four hours, notwithstanding that the storekeeper examined the bales every day, and that on the day previous to those discoveries, not an ant was to be seen in the store. But these insects do not confine their attacks to bale goods. They entered my cellar, and in a few days' time destroyed two dozen of claret; and during a period of four days, while one of the soldiers was in the hospital, they completely gutted his knapsack, which was hanging on a peg in his barrack-room, and contained all his necessaries. They spread through it in all directions, and destroyed his shirts, trowsers, stockings, jacket, shoes, and even razors. Of the latter, the blades were encased in rust, from the moisture, or viscus, which these insects carry along with them, and the horn handles were eaten through. In the course of three or four weeks, they also destroyed thirty pounds' worth of clothes belonging to Mr. Radford, one government tent twenty feet long, three hundred feet of timber in the timber house, three ammunition boxes in the magazine, sixty-five pairs of trowsers, and twenty-three smock-frocks in the engineer's storehouse.

There are several species of bee, and amongst them a very small one about the eighth of an inch in length, that produces fine honey, which they deposit in trees. Mosquitoes and sand-flies are the pest of the island: they kept us in a perpetual fever, and no seasoning by climate secured us against their attack.

From sunrise until sunset, the sand-flies issue forth in millions, and keep one in a constant state of irritation by fixing upon the face, neck, and hands—where, inserting their proboscis, they

inflict most severe pain, and cause the blood to flow most profusely. When they take their departure at sunset, the mosquitoes remind you that the torments of the day are not yet passed; and from six o'clock until ten they exercise their tormenting powers, which are too well known to require description.

The next annoying and destructive insect is the cockroach: these became very numerous, swarmed in the houses, and destroyed clothes, paper, bread, and books, indiscriminately. These insects generally made their appearance at night and, as if by a concerted signal, issued from their hiding-places all at once, and made a noise by scampering along the walls, as if heavy showers of hail were falling. Besides the insects mentioned, I may add the scorpion, centipede, and tarantula, each of which were in great numbers.

Sea Productions.—In regard to the sea productions, my observations are very limited. The following are all I met with:—the common shark, porpoise, sting ray, rock cod, mullet in abundance, cat-fish, pipe-fish, sole, flounder, bream, flying fish, ground shark, and a very good eating fish called by the sailors 'skip-jack.' We never procured any shell-fish; and on my walks along the beaches, I met with very few shells of any kind. It is probable that the natives are always on the look-out for any shell-fish that may be driven on shore, and carry them off for food, as I have found at their encampments the shells of the tiger nautilus, cockles, and oysters. The biche la mer, or sea slug, was found in small quantities, but by no means so plentiful as to induce any of the Malay fishers to approach Melville Island in search of it.

Climate.—The climate of Melville Island is certainly unhealthy from the end of October until the beginning of April, or even until May. The heat is excessive, and the atmosphere, then overcharged with moisture, is extremely oppressive and debilitating. This is the period of the north-west monsoon, or rainy season; and the general range of the thermometer is from 80° to 100° in the shade, and seldom varies more than 12° during the twenty-four hours. The mid-day heat is 89° or 90°, and the extremes 77° and 100°. These were the ranges at Fort Dundas, which was surrounded by swamps, and about twenty-five feet above the level of the sea. At this season, the body is constantly bathed in perspiration—morning, noon, and night; and the debility occasioned by the combined effects of the heat and damp is most distressing. Without any muscular exertion, labour, or even common exercise, debility, weariness, listlessness, and a sensation of excessive fatigue, are universally experienced and complained of. On rising in the morning, fatigue and a want of refreshment is felt; and after a few minutes' slow walking, even after the sun is down, the act of lifting the feet is a fatiguing exertion, and the body feels a

sensation of weight pressing upon it, and bearing it down. Although the settlement of Fort Dundas was surrounded by deep swamps, and broad belts of mangrove growing out of mud beds, yet the swamps, being generally full of trees, and surrounded by thick underwood, the exhalation arising from evaporation was probably not so injurious as it would have been, if cleared from timber. In the mornings at day-break, these swamps were generally covered with a dense vapour, which was dissipated in an hour after sunrise; but for a distance of two or three hundred yards from the swamps, there was always a miasma, or oppressive heavy smell of decayed vegetable and animal matter.

The north-west monsoon sets in about the beginning of November, when the sun is approaching the meridian of Melville Island on its passage to the southward: it is preceded by squalls and variable winds, and its setting in varies sometimes three or four weeks, in comparing one year with another. During this monsoon, there is almost daily thunder in the afternoon and evenings.

In 1824, the rains and north-west monsoon commenced early in November. In 1825, they commenced about the same period. In 1826, they did not set in until December. In 1827, the rain and squalls commenced about the middle of October; but there was that year no regular monsoon either at Melville Island or in the Timor seas. As in all tropical climes, the rain falls in torrents during this season, but seldom continues above two or three hours at a time—falling generally from two to five o'clock in the afternoon, or during the night; therefore, there is scarcely a day but out-door labour may be carried on for a few hours.

The most unhealthy season is during the north-west monsoon, particularly at the commencement of the rains, when fevers, dysentery, diarrhœa, and constipation of the bowels, are very frequent; but from timely remedies, which our system of surveillance insured, these complaints seldom terminated fatally. I observed, that when the setting in of the rainy season was protracted beyond the usual period, sickness was increased: this was the case in 1826, and the same observation was made at Coëpang Timor that year.

We had ten or twelve cases of fever in November and December, five of which proved fatal, the patients dying in twenty-four or thirty hours after being admitted into hospital.

The termination of the north-west monsoon is indicated by squalls, and sometimes a tempest in the early part of April, as was the case in 1827 and 1828. The sun then returning to the northward, the wind settles in the south-east, the sky becomes clear, the rains cease, the atmosphere becomes drier, and the weather more temperate. In May, the hospital, which was generally pretty full during the former monsoon, gets cleared, animal spirits revive, and

the thermometer ranges from 75° to 90°, the mid-day heat being 87° and 89°. June, July, August, and September, are the only tolerably pleasant months in the year; the mornings and evenings are pleasantly cool, and exercise can be freely taken until ten in the morning and after four o'clock in the afternoon, and may frequently, with impunity, be taken even in mid-day. No rain falls during these months, but there are frequent heavy dews at night. In exposed places, vegetation is completely burnt up; but, with great care, some garden vegetables are preserved, the chief of which is the pumpkin. The thermometer during these months is 67° at six o'clock in the morning, 87° at three in the afternoon, 77° at nine at night; the extremes being 63° and 89°. Notwithstanding the great heat at Melville Island at all seasons, and the clearness of the sky during the dry season, or south-east monsoon, the atmosphere contains considerable moisture; although not perceptible to the senses, yet it is evident from the great difficulty in keeping articles made of steel from rust.

Although the wet and dry seasons are pretty regular, yet the winds are not always steady near the land, viz. blowing from the north-west point with the rainy monsoon, and the south-east point with the dry monsoon; but vary several points with each monsoon. In Apsley Straits a breeze frequently sets in from seaward, or from the northward, with the flood tide during the south-east monsoon; but we had no regular land and sea breezes.

Diseases.—During the period I was on Melville Island, we kept a regular hospital register-book, in which every case admitted into the hospital was entered daily, and the disease, treatment, and duration of the patient's illness carefully inserted. I had an opportunity of daily examining this register, and had it copied every morning into the register kept in my own office, for the purpose of transmitting to the colonial secretary at Sydney; therefore, although I cannot exactly carry in my memory the number of deaths, I perfectly recollect the prevailing diseases, most of which I find noted in my journal, as well as many of the deaths. The prevailing diseases were—intermittent, acute, and typhus fevers, constipation of the bowels, vertigo (frequent), dysentery, diarrhœa, rheumatism, scurvy, and nectalopia; the latter disease was very common. The cases of typhus and acute fever appeared at the beginning of the wet season; and when the winds were variable during that period, many were suddenly seized with sickness, violent griping, and delirium. We could not account for the prevalence of nectalopia, or, as it is sometimes called, moon-blindness. Salt meat was certainly generally issued to every person, but they had, besides, a wholesome proportion of flour, rice, or bread, with vinegar, tea, sugar, and a small quantity of vegetables; nor were the settlers exposed to any extraordinary glare from sand or water,

and many who had this complaint used very little of their salt meat. Even when fresh meat was issued, this disease prevailed to a considerable extent.

With respect to the scurvy, it appeared to me to be an endemic disease arising from some peculiar local cause; with new comers, it might be occasioned by a removal from a cool climate to a heated and damp one. This disease only appeared generally at the settlement of Fort Dundas, shortly after its establishment in 1824. The constant use of salt provisions, without vegetables, hard labour during the wet season, and the excessive heat of that season, may have engendered it; and notwithstanding the attention and endeavours of an intelligent and experienced surgeon (Dr. Turner) to prevent and afterwards arrest it, the disease made great progress until the end of 1825, or beginning of 1826. When lime juice was obtained, and vegetables became more plentiful, the disease then subsided. There were, however, several cases of scurvy during 1826, 1827, and 1828, although the utmost caution was taken to guard against it by great attention to cleanliness, use of vegetables, and frequent issues of fresh and preserved meats, pickles, and vinegar. When the first detachment of troops were relieved in 1826, those who replaced them had spirits mixed into grog issued to them every day (the former detachment had no spirits issued); and amongst these very few cases of scurvy appeared, although they lived generally upon salt provisions for the first year, with a very small occasional addition of vegetables, probably once a week.

When the settlement was established in Raffles Bay in 1827, on the north coast of New Holland, and in the same parallel with Fort Dundas, at which place no spirits or wine was issued either to the military or convicts, the scurvy broke out and spread in a rapid and alarming degree, both amongst the soldiers and prisoners.

The site of the settlement and its neighbourhood was dry; the disease occurred during the dry season. The establishment consisted of young healthy men, direct from Sydney, and many of them only a few months from England. The complaint made its appearance among the settlers in six or seven weeks after landing: their diet consisted of a small quantity of salt meat, and occasionally fish (which was caught close to the settlement), with flour, sugar, and tea or coffee. When the malady had attacked and rendered incapable of exertion two-thirds of the settlement, spirits, lime juice and sugar made into punch, was issued to all the worst cases, and grog or wine issued to the military. It immediately remitted in virulence, and ultimately nearly or entirely disappeared. I saw all the sufferers myself, having had occasion to go to Raffles Bay; and from my observations and inquiries,

I certainly thought that the scurvy there, as well as on Melville Island, was endemic, and more dependent on climate and local causes than diet.

Considering the consequences of the climate of Melville Island, during my residence there and that of my predecessor, and knowing the unremitting attention that was paid, and measures adopted, in order to preserve health throughout the settlement during my command, I must pronounce it to partake more of the character of an unhealthy than a healthy climate. I should not recommend invalids to go there during any period of the year to be restored to health, from any part of the world; although from May to September, healthy people may continue in the enjoyment of health with rational care; but from the end of September to May, few can escape some attack or other of illness. The climate, after a year's residence, is extremely debilitating to Europeans; but on the whole, with proper precautions, it does not often engender any fatal complaint. I must, however, mention one gentleman who suffered much from the climate: this was Mr. Miller, of the commissariat, who remained in a very debilitated state for a year and more after leaving the island. I dare say if elevated spots were cleared, extensive openings made, and good commodious airy houses built, Europeans would find it as healthy as any equally low island within the tropics.

The foregoing remarks are applicable to the effect of climate on those living on shore;—the crews of the government vessel attached to the settlement, which plied between Melville Island and Timor, were always in health. The following is an account of the deaths which occurred (as appears on reference to my despatches) from the establishment of the settlement, in September 1824, until I was relieved, in May 1828:—

From September 1824 to September 1826, the population had been 136; the deaths 12. From September 1826 to May 1828, the population had been 135, and the deaths 14. The total number of persons who had resided on the island during these four years amounted to 180, out of which there were 26 deaths; but as six of those deaths were accidental (two of them being caused by drowning, and four killed by the natives) we find only 20 deaths by sickness—which is about one death out of every nine.

I shall here subjoin the result of my thermometrical observations; and may also remark that we experienced successive shocks of an earthquake on the 1st, 2nd, 3rd, and 19th of August, 1827; each shock lasted about a minute. The sensation was, as if the island had been shook violently by some immense power, attended at the same time by an indistinct rumbling noise. It was not an undulating or upheaving, but a violent trembling or shaking motion.

METEOROLOGICAL TABLE.

Season	Month.	Thermometer. 6 A.M.	8 A.M.	Noon.	3 P.M.	9 P.M.	Midngt.	Extreme	Average State of the Weather.
South-east Monsoon, or Dry Season.	April ...	78	82	87	88	82	79	90	Cloudy, with squalls and rain, 1st to 14th; clear and dry from the 15th to 30th.
	May	75	80	87	87	80	77	90	Clear weather, with light easterly and southerly winds.
	June	69	76	84	86	77	75	88	Clear weather, with easterly winds, and strong breezes in the afternoon.
	July	63	70	83	85	69	66	87	A mixture of clear & cloudy weather, with variable winds.
	August .	66	76	85	87	75	72	90	Pleasant cloudy weather, with breezes from the S.E. and N.W.
	Septem. .	70	77	86	87	78	77	92	Pleasant cloudy weather, with variable winds S.E. and N.W.
North-west Monsoon, or Wet Season.	October .	75	80	88	90	82	79	95	Cloudy and sultry, with variable winds; some rain and thunder.
	Novem. .	76	82	90	92	84	81	99	Cloudy, with thunder, frequent showers and squalls from S.E. to S.W.
	Decem. .	83	84	89	90	83	81	99	Cloudy, and calm close weather, much rain, thunder, and squalls; wind N.W.
	January .	80	83	87	88	83	82	91	Squally, with heavy rain, thunder, and oppressive hot nights.
	February.	79	82	87	88	83	81	94	Cloudy, rainy weather, with wind from the N.W. and S.W.
	March ..	78	82	88	90	82	80	95	Cloudy, calm, sultry weather, with rain in the afternoon; wind variable.

Natives.—In personal appearance the natives of Melville Island resemble those of the continent (if I may so call it) of New Holland, and are evidently from the same stock; but they are more athletic, active, and enterprising than those I saw on the southern coast of Australia, at Port Jackson, Newcastle, or Hunter's River. They are not generally tall in stature, nor are they, when numbers are seen together, remarkable for small men. In groups of thirty, I have seen five or six strong powerful men of six feet in height, and some as low as five feet four, and five.

They are well formed about the body and thighs; but their legs are small in proportion, and their feet very large; their heads are flat and broad, with low foreheads, and the back of the head projects very much; their hair is strong, like horse-hair, thick, curly or frizzled, and jet black; their eyebrows and cheek-bones are extremely prominent—eyes small, sunk, and very bright and keen; nose flat and short, the upper lip thick and projecting; mouth remarkably large, with regular fine white teeth; chin small, and face much contracted at bottom. They have the *septum of the nose* perforated, wear long bushy beards, and have their shoulders and breasts scarified; the skin is not tatooed, as with the New Zealander, but is *scarified,* and raised in a very tasteful manner;* and their countenance expresses good-humour and cunning. All those who have reached the age of puberty are deficient of an upper front tooth—a custom common in New Holland. The colour of their skin is a rusty black, and they go about perfectly naked; their hair is sometimes tied in a knot, with a feather fixed in it; and they frequently daub it with a yellow earth. On particular occasions, when in grief, or intending mischief or open hostilities, they paint their bodies, faces, and limbs with white or red pigments—so as to give themselves a most fantastic, and even hideous appearance.† In disposition they are revengeful, prone to stealing, and in their attempts to commit depredations show excessive cunning, dexterity, arrangement, enterprise, and courage. They are affectionate towards their children, and display strong feelings of tenderness when separated from their families; they are also very sensitive to any thing like ridicule. They are good mimics, have a facility in catching up words, and are gifted with considerable observation. When they express joy, they jump about and clap their hands violently upon their posteriors; and in showing contempt, they turn their back, look over the shoulder, and give a smack upon the same part with their hand. In the construction of their canoes, spears, and waddies, they evince much ingenuity, although the workmanship is rough from the want of tools; they are expert swimmers, and dive like ducks. They show no desire whatever for strange ornaments or trinkets; they are polite enough to accept of them without any expression of astonishment or curiosity, but very soon afterwards take an opportunity of slyly dropping them, or throwing them away. The only articles they seemed to covet were hatchets

* The breast of one taken prisoner was scarified, and formed into ridges, much resembling the lace-work on a hussar's jacket.

† They cover their bodies with grease, it is supposed to secure them from the piercing sting of the sand-flies and mosquitoes; and their bodies smell so strong that even the cattle used to detect them at half a mile distance, and gallop off, bellowing in great apparent alarm.

and other cutting tools; but still, when they could steal, they carried off every thing they could lay hold of. As long as we occupied the island, the natives were extremely shy and cautious in all their communications with us; they never intrusted themselves in our power; and notwithstanding my utmost efforts by acts of kindness and forbearance to gain their confidence, and convince them that we desired to be on friendly terms, I found it utterly impossible to accomplish this desirable object. Previous to my arrival they had committed murder, various depredations, and daring acts of violence. They had at length been fired upon whilst committing acts of outrage; and from all my inquiries I believe they had been the first aggressors, by throwing spears. When I assumed the command, I was extremely anxious to court their friendship, as without it, with our limited numbers and means, we never could become acquainted with all the resources of the island, or make them of available use to us: I therefore prevented any of the military or prisoners from putting themselves in contact with the natives without my presence or orders; I allowed no arms to be taken out except by those on whom I could depend, and strictly enjoined that they should only be used against the natives in self-defence, and when by the laws of England it would be justifiable. I feel confident, also, that these orders were strictly attended to; but notwithstanding they continued until the last day distrustful, if not even determinedly hostile. They put two gentlemen of the settlement, one soldier and one of the prisoners, to death, and wantonly wounded several others. During my time we were obliged to fire at them several times; we never knew of any having been killed, although in one or two instances they were wounded; they might have died, and the spirit of revenge might have excited them to other acts of violence. There was a curious inconsistency in their conduct: on one day they would appear good-humoured and friendly, and allow individuals of our settlement to pass unmolested through extended lines of them, and probably on the following day would throw their spears at any individual they could surprise by stealing upon him. They never came near us without their spears and waddies; but sometimes they would leave their spears a few hundred yards in their rear, concealed behind trees, amongst the long grass, or in possession of some young boys, who would run up to them on the first signal; they would then approach within fifty or sixty paces, extend their arms, throw their waddies to the rear in token of amity, and then by signs oblige all those who approached them from our side to extend their arms also, and turn round to show they had no weapons concealed; when satisfied, they would enter into a palaver, and two or three of the most daring would advance in front of the others, which latter (part

formed in a group, and a part extended singly to a distance of a quarter of a mile on each flank) would remain ready to support them in case of emergency. These few in advance would allow one or two of our people to approach within two or three paces of them, determined to maintain a superiority of two or three to one. Fearful of drawing this memoir out to too great a length, I must refrain from relating any of their daring and cunning acts of aggression, or the numerous interesting occurrences which took place. Suffice it to say, that we had one of these savages as a prisoner for several weeks, from whom I learnt a good deal of their character; and the following little circumstance caused me to conjecture, at an early period, the reason of their being so suspicious of strangers:—

In one of my interviews with a tribe of the aborigines, who had approached to the outward boundary of the forest, and within half a mile of the fort, I observed that they appeared more familiar than usual. Having previously prepared a medal, attached to a piece of scarlet tape, I expressed a wish to hang it round the neck of a fine-looking young man, who bore a feather in his hair, and appeared to have some authority. This young man remained at a short distance (two or three paces), took hold of his wrists, and appeared as if struggling to escape from the grasp of an enemy; he then pointed his hand towards his neck, looked upwards to the branches of a tree, shook his head significantly (evidently in allusion to being hung), and avoided coming nigh enough to receive the proffered gift. This led me to imagine that the island had been visited by strangers, and the natives forced away by them as slaves; in corroboration of which opinion, I may add three other circumstances which came under my notice:—

The first is, that the Malay fishermen, from Maccassar, are forbidden to go near Melville Island (which they call *Amba*), alleging that it is infested by pirates—probably slavers, as amba, in the Malay language, signifies a slave.

The second circumstance relates to a lad, who had been taken from a native tribe in 1825, and detained at the settlement three or four days, when he escaped.* This lad was the colour of a Malay, and possessed their features: whence it is probable that he was taken when a child from some Malay slave-ship or fishing prôa, and reared amongst the Melville Islanders.

The third circumstance is, that when Captain King, R.N., entered Apsley Straits, in 1818, and was proceeding towards the shore near Luxmorehead in his boat, a number of natives were on the beach; and a female, who entered the water in order to decoy him close to the shore, called out 'Vin aca, vin aca.' This being a Portuguese expression, induces me to believe that vessels from the Portuguese settlement of Delhi, on the north side of

Timor, might have visited Melville Island, for the purpose of seizing the natives, and carrying them away as slaves.

During the four years that this island was occupied, only two aboriginal females were seen, and at a distance: they were both old and ugly, and their only garment was a short narrow apron of plaited grass. We frequently saw young boys, from six to twelve years of age, along with the men: they were well made, plump in person, good-looking, and with a remarkable expression of sharpness in their eyes.

The weapons used are spears and waddies: the spears are from ten to twelve feet long, made of a heavy wood, and very sharp-pointed; some are plain, others barbed—some have a single row of barbs, from twelve to fifteen in number, and others a double row: they may weigh three pounds, and are thrown from the hand (without any artificial lever, as at Port Jackson) with great precision and force, to a distance of fifty or sixty yards.

The waddies are used as weapons of attack, as well as for killing wild animals and birds. They are made of a heavy wood, twenty-two inches long, one and a half in diameter, pointed sharp at one end, and weighing above two pounds; they are not round and smooth, but have sixteen equal sides, with a little rude carving at the handle, to ensure their being held firmer in the hand.

Their canoes, water-buckets, and baskets, are made of bark, neatly sown with strips of split cane. The canoes consist of one piece of bark, are twenty feet long, twenty-eight inches wide, and fifteen deep; the stem and stern are neatly sewn with thin slips of cane, and caulked with white clay; the gunwales are strengthened by two small young saplings (such as grow in marshy places) fastened together at each end of the canoe; the sides are kept from closing by pieces of wood placed across, and which also answer as seats.

The natives of Melville and Bathurst Islands are divided into tribes, of from thirty to fifty persons each; I do not think that I ever saw above thirty-five or forty men together, although some individuals, surprised by them in the forest, have reported having seen a hundred; the noise they make, and their jumping from tree to tree, make them often appear more numerous than they actually are. They lead a wandering life, though I think each tribe confines itself to a limited district; and probably when tired of one, or their resources are exhausted, the strongest may usurp that of a weaker. In 1824-5 a tribe of daring athletic men kept constantly in the neighbourhood of Fort Dundas. In the beginning of 1826, a strange tribe visited the settlement, and they were generally slight-made men; but by the end of the year the former tribe returned, and continued to remain in the neighbourhood until the island was abandoned in 1829. During the dry season they dispersed them-

selves a good deal on hunting excursions, and burnt the grass on the forest grounds for that purpose from April to September. I think when they move that their women and children accompany them, as female voices were frequently heard at a distance at night, proceeding from their encampments. They generally encamp on sandy banks, amongst the mangroves, or on dry open spots near swamps, or on the sea-coast. They do not give themselves the trouble of constructing wigwams in the dry season, merely forming a bed of palm-leaves, or long grass, wherever they repose for the night; but during the wet season they have some covering, and their encampment being more stationary, displays a little comfort, and is generally in a pleasant spot near the sea.

The following is an account of my visit to one:—Upon landing under the high sandy beach, we came upon an extensive encampment of natives; the men, women, and children all fled like frighted deer, and left us quietly to examine their domestic economy. There were thirty wigwams, all made of newly-stripped bark; each consisted of a single sheet of bark, formed into a shed or mere roof, open at each end, with a fire at the entrance; the interior space was four feet and a half long, three in width, and three feet high. Pieces of soft silky bark, rolled up in several folds, and answering as pillows and seats, were in each wigwam. Some of these erections were placed under spreading shrubs; and the twigs being artfully entwined into each other, formed a tasteful inclosure. Several of them were ornamented inside by figures drawn with white clay: one in particular was neatly and regularly done all over, representing the cross-bars of a prison-window. The utensils consisted only of bark buckets and baskets; and the ground around was strewed with the shells of turtle, crabs, oysters, and limpets. At one end of the encampment lay the materials for constructing a canoe; and on a block of wood close to it was observed marks made with an axe, or tomahawk. We committed no depredations, and saw the natives hastening back when we quitted the shore.

The food of these people consists of kangaroo, opossum, bandicoot, iguanas, and lizards during the dry months; fish, turtle, crabs, and other shell-fish, during the wet months; and their vegetables are the cabbage-palm and fruit of the sago-palm. They eat their meat just warmed through on a wood fire; and the seed of the sago-palm is made into a kind of mash. Amongst those natives whom we encountered, I never saw any deformed, or having the appearance of disease or old age;—probably such were left with the women, in places of security, and only the able warriors came near us. There was one powerful, determined-looking fellow frequently seen, who had lost a hand; and he

threw his spear by resting it on his maimed arm, and taking a deliberate aim.

Although the Aborigines of Melville and Bathurst Islands are of the same race or breed as those throughout New Holland, yet their language is different. We had a native of the southern coast with us for a short time, and he could not understand a word they uttered. They speak low and quick to each other; but their pronunciation is so indistinct, we scarcely ever made out a word. I was in hopes of picking up much of their language from the native we had made prisoner, but during the time that I was absent on an excursion to Port Essington, he effected his escape. His dialect did not sound harsh; and his expressions were very significant, from the gestures with which he accompanied them.

The following are some of those expressions: —'*Co curdy*'—Water, give me some water, or I am thirsty; '*Hooloo, hooloo*'—My belly is full, I am not hungry; '*Bungee*'—Fire-arms; '*No bungee*'—Don't fire; '*Peerce*'—An axe; '*Pakee*'—Peace or friendship; '*Piccanini*'—Children.*

I do not think that these Islanders ever cross over to the coast of New Holland; for the currents are so rapid in Dundas and Clarence Straits, that it would be dangerous for their slight canoes; and although so close to the Cobourg Peninsula, yet the spears of the Melville Islanders are differently formed from those used by the natives of that peninsula, and much heavier.

It appears to be the custom of the natives to bury their dead, their burial-places being in retired spots near their most frequented encamping ground. The burial-place is circular, probably ten or twelve feet in diameter; it is surrounded by upright poles, many of which are formed at top like lances and halberts, fourteen or fifteen feet high; and between these the spears and waddies (probably of the deceased) are stuck upright in the ground.

It is quite impossible to form any estimate of the numbers of the natives, but they are seen on all parts of the coast of these two islands. I shall not presume even to give a guess at their probable number.

The following is a list of the exotic fruits, grain, vegetables, &c., which we cultivated in Melville Island; with remarks on their success.

* Wharra-wharra is also a common expression of the natives, when calling aloud to each other, or wishing to attract attention. [Wharra is the name of a palm at Tongataboo.]

List of Fruits, Vegetables, Roots, Plants, and Grains, which were grown or tried on Melville Island.

Names.	Quality.	Remarks.
Plaintains	Excellent.	Produced fruit throughout the year.
Custard Apple	Ditto.	Ripe from February to April.
Cocoa-Nut	Ditto.	Plants throve well, 1826—9.
Lemons	. . .	All these plants were thriving well, but had not advanced far enough to produce fruit.
Limes		
Shaddock		
Orange		
Mango		
Guavas		
Tamarinds		
Pomegranate		
Pine Apples	Very fine.	Abundant, and promised to produce throughout the year; weighing from 4 to 6 lbs.
Papaw Fig	Ditto.	In fruit at all seasons.
Melons (six kinds)	Ditto.	Ripe from February to June.
Water Melons	Ditto.	Ditto during nine months of the year.
Pumpkins	Good (not large)	Ditto from December to August.
Yams	Very good.	Fit for using in June.
Sweet Potatoes	Ditto.	Ditto all the year round.
The Common Potatoes	Very bad.	Could not be cultivated.
Onions	Good.	Particularly the small white potato-onion.
Turnips	Very bad.	The tops only could be used.
Bringal	Very good.	Ripe from October to March.
Beans (varieties)	Ditto.	Ditto from November to March.
Peas	Bad.	Did not grow well, and destroyed by vermin.
Cabbage	Very good.	Fit for use in July.
Cucumbers	Ditto.	Ditto from November to April.
Cress	Ditto.	Ditto during the rainy season.
Capsicum	Ditto.	In fruit during six months of the year.
Calavances	Ditto.	Liable to be destroyed by grubs.
Endive	Ditto.	In season from December to May.
Parsley	Ditto.	Ditto from December to April.
Beet-root	Good.	Grew large in garden mould.
Radishes	Very good.	In season in Nov. and Dec.; but did not seed.
New Zealand Spinach	Ditto.	Ditto ditto, and throve well.
Vegetable Marrow	Ditto.	Ditto from February to June.
Arrow-root	Ditto.	Ditto in July.
Ginger	Ditto.	Ditto ditto.
Saffron	Ditto.	Produced about one pound to each root.
Sugar-cane	Rather weak.	Indifferent, from want of an experienced cultivator.
Turmeric	Pretty good.	
Cotton	Short and coarse.	Produced three or four crops a year.
Indian Corn	Very good.	Planted in Nov., and ripe in April or May.

I shall next make a few remarks on the effect which the climate had upon our domestic live stock.

The English breed of cattle, when first landed upon Melville

Island died in great numbers; but those which survived, latterly turned out well, remained healthy, had beautiful sleek hides, and reared fine calves. They were herded on the borders of the swamps from daylight until sunset, when they returned to the stock-yard well-filled, and gave excellent, sweet, well-flavoured milk.

The buffaloes, introduced from Timor, herded separate from the English cattle; nor could we get them to associate together. After being first landed, generally a third or fourth part died within the first fourteen days, from inflammation of the bowels. This disease is brought on either by change of climate or some bad quality in the grass. The appearance of the animal when taken ill, was drowsiness, lying down, swelling of the bowels; and death ensued in five or six hours. We at first thought this disease was brought on by over-eating green grass, or drinking too much water, on being first landed from the ship; and this suggested the plan of keeping them in the stock-yard for the first week, feeding them on hay and green grass mixed, giving them but little water, and increasing the allowance of food daily. Many, however, died under this treatment; and others did not survive long after being driven out to pasture at the expiration of the week. Ultimately, I built long roomy sheds, under which the buffaloes were allowed to shelter themselves from the sun, from ten o'clock in the morning until three in the afternoon; and as these animals delight in wallowing, like pigs, in mud holes and pools of water, I directed them to be driven to such places (both morning and evening) as would enable them to enjoy this refreshment. This system, combined with caution in feeding them for the first week after being landed, tended to diminish the deaths from one-third to one-tenth.

Sheep did not thrive well, for although they increased tolerably, yet they never became fat or fit to be killed for food From 1824 until May 1828, only two of the New South Wales breed were killed at the settlement; and neither weighed fifteen pounds. It is remarkable, that the sheep introduced from Sydney lived better on the island than those which were brought from Timor: the difference of latitude between that island and Melville Island is only one degree, yet, out of one hundred sheep landed at different times, not above five survived the first fortnight or three weeks.

Goats, which are considered a hardy animal, died off even faster than sheep: out of about twenty, which were introduced in the course of four years, from Timor, not one lived beyond twenty days, although carefully fed and confined in the stock-yard. Goats from Sydney lived better, as two only out of six died.

Pigs did not thrive unless provided with plenty of grain and cooks' fat. The swamps, being too full of water, afforded no

food; nutritive roots were scarce, and earth worms were not met with. The roots and heart of the fan and sago palms sometimes afforded a little subsistence, as did occasionally the young sprouts of the cabbage palm; this was, however, but the precarious and scanty subsistence of such pigs as wandered (at the risk of being speared by the natives) to a distance from the swamps and fort. The government stock of pigs, amounting sometimes to 130 or 140, were, in consequence of an insufficiency of grain, always poor and unfit for killing; and yet they wandered at liberty all day: whereas those which were house-fed by private individuals were always fat, and afforded excellent meat.

Poultry did well during the dry season, and as long as a little Indian corn or paddy (rice with the husk upon it) could be procured: they, however, required great care in rearing, as the chickens were very subject to blindness during January, February, and March; and the almost constant thunder, from October to April, frequently destroyed every young brood of chickens at the settlement at the same hour.

Towards the end of 1827, I had sufficient experience to form a more correct opinion of the advantages and disadvantages of Melville Island, as a commercial station, than I had twelve months before. I also made myself acquainted with the places of resort of the Malays, and their period of approaching the coast of New Holland; as well as ascertaining the most desirable situation for a settlement on the north coast. I represented to his Excellency the Governor of New South Wales the disadvantages under which Melville Island laboured, and which appeared to me to counterbalance any argument that could possibly be offered in its favour.

Some of these objections were as follows. The approach to Apsley Strait was greatly obstructed by shoals; it was out of any direct line of trade, and had never attracted the attention of the traders of any nation whatever, not even the Malays, who annually came within thirty miles of the island, and within a hundred miles of the settlement: this enterprising people avoided Melville Island, both on account of their instructions from Macassar and their aversion to enter narrow straits where there are strong currents. The soil near the settlement was generally light, and difficult to bring into a state for cultivation, and European labour I considered inadequate to do justice to it. The climate was extremely debilitating, although not decidedly very unhealthy; and the constitutions of Europeans suffered much from its effects. In the course of twelve months, nearly every individual belonging to the establishment had been in hospital, and some of them three or four times. These combined circumstances, with several other obstacles, already mentioned in this memoir, were so much at

variance with the prosperity of a young settlement, and had operated so much against it for three years, that I felt convinced there was no chance of opening a commercial intercourse between Melville Island and the Indian Archipelago, either through the medium of native vessels or others. Thus, the main object of Government in forming an establishment in this part of the world, with a view of extending our commerce by introducing European manufactured goods more generally into demand throughout the Indian islands, was completely frustrated.

From an impression that Melville Island would be abandoned, I directed my attention more to the eastward, to that part of the coast of New Holland to which the Malay fishing-proas resorted regularly every year. I visited the Cobourg Peninsula, and surveyed Port Essington, which latter place I found to possess many advantages over Port Cockburn.

Port Essington is situated on the north side of the Cobourg Peninsula, which projects N.N.W. from the main land of Australia, and extends in that direction about fifty geographical miles. The greatest breadth is fifteen miles, and its narrowest part, where it is joined to the main by a neck of land of five miles in length, is two miles and a half across, from Mount Norris Bay, on the north-east, to Van Diemen's Gulf, on the south side of the peninsula. This gulf was discovered and so named by the Dutch navigators, in 1705.

The port is in 11° 6′ south latitude, and in 132° 12′ east longitude. It was examined by Captain King in 1818, and named by him after Vice-Admiral Sir William Essington. Vashon-Head, Point Smith, Knocker's Bay, Middle-Head, Table-Head, and Saddle Hill, were names also given by Captain King; such other names as appear in the chart of my survey were given by me, generally from local circumstances.

The approach to Port Essington is perfectly open and unobstructed by any danger whatever; at its entrance it is seven miles wide, between Point Smith on the east side, and Vashon-Head on the west: the general direction of the port, which extends between seventeen and eighteen miles, is S.S.E. ¼ E., having a depth of water throughout of nine, twelve, and five fathoms; its average breadth is five miles, and at the southern end it forms three spacious harbours, each of them extending inwards three miles, with a width of about two; the depth of water being five fathoms, with a bottom of stiff mud and sand. These harbours are sheltered from every wind, and would afford excellent and secure anchorage for vessels of any description, being perfectly free from hidden danger; indeed, the whole port is a secure

place of anchorage for vessels of any size, and forms altogether one of the finest harbours in the world. There is no harbour yet known (Port Jackson excepted) to be compared to it in the whole extent of Australia, and it may be entered in safety, as well during the night as by day. It may be also approached at all seasons; would be a convenient place of call for vessels proceeding from Sydney, through Torres Strait, to Java, Singapore, and India; and from its contiguity to Timor, New Guinea, Celebes, and the other islands of the Indian Archipelago, it is accessible to the Malay and Bugis' trading proas, as also the junks from China, in consequence of the regular monsoons, which extend many degrees to the southward of Port Essington*.

There are few dangers that I could observe in the whole extent of this noble port, and certainly none but what are visible, and can be easily avoided. At the entrance, on the west side, there is a shoal encircling Vashon-Head; it runs out about a mile, and is partially uncovered at low water; its outward edge is abrupt, and the water suddenly deepens from one fathom and a half to three, six, and nine fathoms. Off Turtle Point, on the west side of the port, there is a rocky islet and a circular reef which extends three-quarters of a mile from the shore; but on the opposite or east side of the port, the water is deep close to the shore. At half a mile W.N.W. from Table-rock Head, there is a small rock which is uncovered at half-tide; but within twenty or thirty feet of it, there is five fathoms water. The next danger is between Table-rock Head and Malay Point; here there is a range of rocks at one mile distance from the shore, which retires and forms a bay. These rocks bear south from Table-Head: there is a ripple upon them at high water, and at ebb-tide they are partly uncovered. From Oyster-Head, a reef (which is dry at low water) runs out in a northerly direction to the distance of half a mile. Off Spear Point, which is opposite to Malay Point, the water is shoal to the distance of nearly half a mile from the shore; but there is plenty of room for any vessel to pass, with a depth of ten and twelve fathoms between that and Malay Point; and within twelve yards of the latter point, there is ten fathoms. This channel is the entrance into the two inner harbours, of which Middle-Head forms the separation. Along the front of the projection which forms Middle-Head the water is shoal, and studded with small sharp-pointed rocks, running out to a quarter of a mile distant from the shore. There is a shoal, or rather a bank, off Mangrove Point, which is dry at low water, and a bar being formed between this bank and the opposite point to

* The general range of the monsoons is to twelve degrees from the equator, but it sometimes reaches to thirteen and fourteen degrees of south latitude.

the westward, the bay beyond it (and which is in itself very shallow) is of no use as an anchorage.

I have now enumerated all the dangers (if such they can be called) which I could distinguish; and on reference to the plan of Port Essington, it will appear obvious that none of them can seriously militate against this extensive port being one of the safest and finest in the world.

The shores of this harbour present a pleasing variety of little bays and sandy beaches, alternating with bold cliffs and steep clay banks; whilst inland, the continuous forest of trees, of rather a monotonous dark-green foliage, is occasionally relieved by small round hills, rising a hundred feet above the general elevation of the land; which land, gently undulating, rises from one hundred to two hundred feet above the level of the sea, but in many places only from thirty to sixty feet.

The cliffs, rising perpendicularly fifty or sixty feet from the water, are in some places of a dark-red colour and ferruginous nature, and in others of a dusky-white indurated clay. There is also a coarse-grained white sandstone, which I observed in Kangaroo Bay, and on the west side of the inner harbour beyond Malay Point.

Soil and Vegetable Productions.—In my several excursions on both sides of the port, I met with a variety of soil, and certainly that of an indifferent quality preponderated; yet I observed many situations in which the soil was very good, principally on the low flats and hollows, and near places which were evidently swampy in wet weather. On the highest grounds near the shore, such as Table Rock, Observation Cliff, and Oyster Head, the land is rocky, with a shining rounded ironstone, of very weighty substance, similar to that so general on Melville Island. The soil in which this stone abounds was found very detrimental to vegetation at the settlement of Fort Dundas, and we had not a sufficiency of materials convenient enough to correct it; but at Port Essington, such materials as sea sand, salt-water mud, coral for lime, are all abundant. On the moderately elevated land, as Curlew Point, Turtle Point, and behind Kangaroo Bay, there are comparatively few stones; and the soil, although light, and mixed with a good deal of sand, nevertheless appeared productive.

The vegetation around the port was abundant and very luxuriant. The forest land is clear of underwood; the lower grounds and hollows produce good grass (even in the middle of the dry season); and wide-spreading shrubs and flowers are there numerous. From my experience at Melville Island, the climate of which is the same, and the soil similar to that around Port Essington (which latter possesses other superior local advantages)—as also

from the manner I saw several tropical productions cultivated on the Philippines, Java, Timor, and Singapore—I entertain a strong conviction that most, if not all, tropical productions could be brought to considerable perfection on the Cobourg Peninsula.

Although the timber in the vicinity of the coast is generally not of great dimensions, yet the species are various, and of sufficient size for house-building and agricultural purposes; and from the specimens of larger timber which I saw near Raffles' Bay (which is also on the Cobourg Peninsula), as well as from my intimate knowledge of the wood of Melville Island (in the same latitude, and with similar soil to Port Essington), I am satisfied that timber is to be found near Port Essington fit for every purpose, including household-furniture and boat and ship-building; but I do not think there are good spars for the masts and yards of large vessels. The trees on the high stony grounds around the port measure from fourteen to sixteen inches in the diameter of the trunk. On Malay Point, which is low, with a sandy soil, the trees are of larger dimensions, and the trunk measures about twenty-six inches in diameter. The Eucalyptus species are numerous throughout; the hibiscus, casuarina, sago palm, fan palm, grass-tree, and cabbage palm, are also very conspicuous; as are likewise runners and parasitical plants.

From the circumstance of the soil, climate, and latitude being nearly the same as those of Melville Island, and all the indigenous productions which I saw being similar, I conclude that the same species and varieties are common to both, and shall therefore refer to the list I have already given of indigenous productions in my account of Melville Island. For similar reasons, I likewise refer to the list of exotic productions which had been tried and succeeded well at Fort Dundas. The latter will be a good criterion by which to estimate the productiveness of the soil of Port Essington; particularly as, when I visited the settlement in Raffles' Bay, which is only thirteen miles east of the above port, I found all the plants which I had sent from Melville Island to Captain Smyth, of the 39th regiment, (then commanding at Fort Wellington,) thriving well; and in the second year from the establishment of that settlement in Raffles' Bay, the orange, lemon, shaddock, cocoa-nut, and tamarind trees, were succeeding very well indeed; the pine-apple plants were strong and healthy, bananas were abundant, as were also pumpkins and sweet potatoes; the sugar-cane, turmeric, arrow-root, capsicums, and other culinary vegetables, were rapidly increasing: therefore, from these corresponding circumstances, any observations on the productions of Melville Island may be considered as completely applicable to Port Essington.

From the long continuance of dry weather in these latitudes

artificial vegetation suffers very much during six months in the year; and, as at Fort Dundas, we had no streams of water from which we could irrigate the gardens and fields, and the formation of tanks was not sanctioned, on account of the expense, our gardens produced very little indeed during the dry season: though by keeping a number of casks, and filling them with water daily from the wells, we in some measure counteracted the effects of the long drought. However, as there is much more water at Port Essington than was imagined, garden and field culture may reasonably be expected to be more satisfactory.

Having mentioned three places where water was obtained, I have to add, that, besides them, I met with pools of drinkable water a little inland, behind the flat ground which in my plan I have named Native Companion Plain (the native companion—a species of ardea—is a very large bird, which I saw in flocks there; they stood four feet in height; plumage, blue-grey; head, scarlet; legs, long; and the bill seven or eight inches in length); and, towards the end of the dry season, vegetation looked very fresh in the hollows and shaded places. Two other indications of water being in the neighbourhood of Port Essington, I may also mention; the first is, that the natives are numerous around it and constantly seen there—they must require water. The second indication is the great number of kangaroos I observed, which animal is generally in the neighbourhood of water and good pasturage.

Besides the indigenous vegetable productions enumerated in my list, I may mention, that a vine producing a small grape was met with at Raffles' Bay; and some excellent roots, which I did not find on Melville Island, but which, at Port Essington, the natives use as food.

Animal Kingdom.—Of land animals and birds I observed kangaroos, bandicoots, iguanas, pigeons, quail, curlew, native companions, wild geese, ducks, and swamp pheasants; besides great varieties of perroquets, cockatoos, hawks, herons, cranes, and gulls. The fishing-hawks were extremely audacious; and frequently when, after hauling the seine, we left the fish we had caught piled together on the beach, and removed from fifty to a hundred yards off, to draw the net at a fresh place, these birds would dart down and invariably carry off a fish: they were so daring, that I was at last obliged to leave a sentry to protect those we had taken.

Port Essington is well stored with fish; and from the numerous extensive sandy beaches around it, there is great facility in procuring abundant supplies with the seine. The Malay fishermen also catch very fine fish with a coarse pearl-shell hook and line. Amongst the fish we took there were mullet, cavallos, bream,

gar-fish, flounders, whitings, a kind of pike, white mackerel, sting-ray, a fish resembling a herring, but fourteen or sixteen inches long, skip-jacks, old wives, and several others. Of shell-fish there are, the common oyster, and the large mother-of-pearl-shell oyster, green turtle*, spotted crabs, oysters, cockles, crayfish, couries, and various other small shell-fish; and quantities of sponge.

The large sea-slug called trépang, or *bêche la mer*, is very abundant all along the north coast from Endeavour Strait, in long. 142° 30′ E., to Dundas Strait, between Melville Island and the Cobourg Peninsula, and attracts a large fleet of Malay proàs during the months of December, January, February, March, and April; their fishing-ground extending from the Gulf of Carpentaria to Dundas Strait. The principal part of these proàs come from Macassar; they may measure from twenty to forty tons each, and are manned with from sixteen to thirty hands, and sometimes as many as forty. Each proà is commanded by a chief (called a Nacodah), and to each of these vessels from three to five canoes are attached. The canoes are from eighteen to twenty-five feet long, hollowed out from the trunk of a tree. These proàs are independent of each other, and the chief or master is not the owner, but merely acts for the proprietor, who resides at Macassar. He is not permitted to dispose of the trépang during the voyage, but is obliged to return to Macassar with the whole produce of his fishing. In November they commence their fishing by going to the eastward through Bowen's Strait, gradually returning to the westward until April or May; when, having cured the trépang and completed their cargoes, they repair to the ports in the Indian Seas from whence they sailed.

A trépang curing establishment is formed every year in Port Essington on Malay Point, and sometimes in Knocker's Bay. The buildings are of bamboo, which the Malays bring along with them, and remove when they quit the coast. A description of these temporary erections, as well as the manner of preparing the trépang for exportation, would unnecessarily lengthen this memoir; I shall therefore not dwell upon it, and only give a short description of the animal itself.

The trépang is an animal resembling a snail in its form and substance; it measures from eight to twelve inches in length; is cylindrical, and about five inches and a half in girth; the two extremities are round, and without close examination it is difficult

* The turtle are generally of the kind called green turtle; but it is probable that the hawks-bill also exists on this coast, as some specimens of turtle-shell brought to England by the writer, (which he received from the islanders in Torres Straits,) when worked up, admitted of a high polish, and were richly marked and transparent.

to decide which is the head (probably resembling in this respect a leech more than a snail). The mouth is transverse on the lower side of the head; I did not observe the eyes (which must be very small), nor did I sufficiently note the other parts of its physical structure to venture on a more minute description. The lower part or belly is flattish, and it did not appear to be furnished with any membrane so as to enable it to swim. They are generally found stationary amongst sea-weed, or on sand-flats in shoal waters. There are two kinds of trépang—the one of a dark or blackish colour, the other a lighter or grey colour. The last is ten inches in length, and considered the best: the skin is rather roughish and tough; it feels firm and stiff when taken out of the water, and the flesh is a mass of gelatinous substance.

The name given to this coast and its native inhabitants by the Malays is 'Marega.' They call Port Essington 'Limboo Moutiara' (Port of Pearl-shell); and the Aborigines call the Malays 'Mulwadies.'

The Malays represent that they found the natives extremely troublesome and hostile all along the northern coast; and they were glad when in Raffles Bay, at the time of our having a settlement there, they found themselves protected from the Indians, and were able to repair their vessels without being molested by them. Previous to our occupation of Raffles Bay they were accustomed to resort for these purposes to a small island outside, close to the west point of entrance into the bay.

Climate.—The climate of the Cobourg Peninsula must be similar to that of Melville Island, therefore it will be unnecessary for me to dwell long upon it. I took a great deal of exercise there during all hours of the day, as did the whole of those along with me, amounting to thirty persons; and none of us experienced even a headach. Port Essington being more open to sea breezes, and much freer from mangroves and mud-banks than Apsley Strait, the air must consequently be more pure, and less subject to that miasma which frequently arises from mangrove banks. I found the temperature the same as at Fort Dundas; and on comparing the account of sickness at Raffles Bay with that on Melville Island, I remarked that they had fewer varieties of complaints than we had, as also fewer cases of illness in comparison to their numbers: this I attribute to the air being less debilitating along the coast of the Cobourg Peninsula, and thereby rendering the human frame less susceptible of disease.

In such a situation as Port Essington the mind is also more pleasingly exercised than in Apsley Strait, which I consider another great auxiliary to health. The settlement in Apsley Strait I may compare to an extensive penitentiary, shut out from the world, where a uniform and unvarying occupation em-

ployed each individual day after day, month after month, and year after year—a constant, tiresome sameness: an avoided place, never enlivened by the face of a civilized stranger—excluded from all communication with the world, excepting once in six months, when a colonial craft came from Port Jackson, with salt junk, flour, and other supplies. And the view from this penitentiary (as it really may be called) was bounded all around by a broad impenetrable belt of mangroves, backed by a forest of trees that were never denuded of leaves, and which, in place of being of a verdant green, were of an unchanging ever-greyish hue. Whereas at Port Essington, its occupation by a well-organized colony would attract the attention of strangers; and being a convenient place of call for vessels bound from Port Jackson to the Indian and China seas, this, with the annual visits of the Malays, would create an interest, and be a constant source of action for the intellectual powers. From Port Essington the eye may wander as far as the human sight can be carried over a wide expanse of ocean (always a noble sight), or be directed inland, where it may rest on some wooded knoll—be attracted by the graceful waving of the *Seaforthia elegans*, or the numerous smokes rising and curling from amongst the trees, as they ascend from a native encampment, or from their burning the grass on hunting excursions.

The meteorological table which I kept at Melville Island may be referred to as applicable to Port Essington, as well as my remarks on the monsoons. In addition, however, I may observe that there are frequent sea and land breezes along this coast, but by no means regular. The monsoons blow uniformly (from the south-east and the north-west, in their respective seasons) at forty miles from the coast; and although in-shore, they generally blow in the same direction as the prevailing monsoon, yet they frequently vary, and appear, as already stated, as sea and land breezes.

Tides and Currents.—The tides in Port Essington rise and fall about ten feet at the full and change of the moon: their velocity is inconsiderable, excepting off Malay Point, where, from the contraction of the channel, they run at the rate of from a mile and a half to two miles and a half an hour. The tides appeared to me frequently to influence the wind, as I found it after a calm to spring up and blow into the port with the flood, and again either fall calm or blow out with the ebb.

The currents in the open sea depend upon the monsoon—running to the westward with the south-east monsoon, and to the eastward with the north-west. But in-shore they are influenced by the tide—setting to the south-west with the flood, and to the east or east-north-east with the ebb, running from a mile to two miles an hour.

Natives.—The Aborigines around Port Essington and its vici-

nity are the same in appearance with those of Melville Island; but their habits are somewhat distinct, and their weapons a little different. They both go naked, are alike addicted to pilfering, and display similar characteristics of cunning; but I do not think the natives near Port Essington are so daring in their enterprises. I never saw a Melville islander, with an ornament beyond a feather in the hair, scarifying the body, and bedaubing the head, face, and every part of the skin with yellow, white, or red pigments. But on the Cobourg Peninsula the natives have a fillet of net-work bound round the waist, and another round the head and arms, with sometimes a necklace; and they paint their bodies occasionally in the same manner as I have described in my account of the natives of Melville Island. Such of their canoes as I saw were hollowed from the trunks of trees, like those of the Malays, and were probably either left by these people or stolen from them, for I do not think they have any means of hollowing them out themselves.

Their weapons are spears and clubs: the spears are about ten feet long, and lighter than those of Melville Island; and their war ones, named 'Burreburai,' instead of being barbed like a fish-hook, as they are on Melville Island, are serrated like a saw. I should imagine from their weight that they are thrown from the hand, without the lever which is used near Sydney and King George's Sound; but they are by no means so formidable as the Melville Island ones. Four of those of Port Essington fell on board a boat belonging to the brig Anne, but fortunately did no injury. They have others at Raffles Bay, called 'Imburbé,' headed with stone; and also a small sharp-pointed spear for killing fish;—the clubs are rudely shaped, about four feet long and two inches in diameter. These natives wander about in certain districts, and subsist as those I have described in the second chapter; but from the number of turtle-shells I observed scattered about in my excursions round the port, I imagine they are better supplied with that important article than their insular neighbours of Melville Island.

I remarked one native burial-place at Port Essington: it was near Native Companion Plain. The grave was very simple, and placed under a widely-spreading tree. The space occupied was six feet long by three wide, over which was formed an open frame-work of twigs, the ends being inserted in the ground on each side. Upon the grave lay a skull, evidently of an Aborigine, with a thigh or arm bone; the scull was coloured red, as if with some dye*, and the teeth appeared as if they had been burnt. What I have related is all that came under my own

* Probably a red ochre, which is common along the north coast, and gives to the argillaceous cliffs a ferruginous tinge.

notice; but as it may be interesting to some, I shall conclude my observations regarding the natives on this coast by introducing an account given of them by a gentleman who interested himself in their character, manners, and habits, at Raffles Bay (at which place they became very familiar); for the communication of which I am indebted to Captain Stoddart, of the Royal Staff Corps:—

"In personal appearance they bear some resemblance to the natives about Port Jackson: they are, however, better made, and have more intelligent, and perhaps more savage countenances; they go entirely naked; their skin, particularly the breast and thighs, is ornamented, or disfigured, with gashes; their hair is long, and generally straight, yet I observed some crisp. Some of them have a fillet of net-work, about two or three inches wide, bound tightly round the waist, with a similar ornament round the head and the arms, and sometimes a necklace of net-work depending some length down the back. Several of them have the front tooth in the upper jaw knocked out, in the manner described by Captain Collins. They paint their face, and sometimes the entire body, with red earth: and those who are inclined to be dandies draw one or two longitudinal lines of white across the forehead, and three similar on each cheek; while a few who appeared to be 'exquisites' had another line drawn from the forehead to the tip of the nose. The *septum narium* is invariably perforated; but it is on particular occasions only that they introduce a bone or piece of wood through it, and sometimes a feather. In this part of the coast the natives are divided into three distinct classes—a circumstance quite unique. The first and highest class are named 'Mandrogillies;' the second 'Manburghes;' and the third 'Mandrowiles.' The first class assume a superiority over the others, which is submitted to without reluctance; and those who believe in real difference of blood amongst civilized nations might find here some apparent ground for their belief: as the Mandrogillies were observed to be naturally more polite and unaffectedly easy in their manners than the others, who it was imagined were neither so shrewd nor so refined. This, however, might be only imaginary.

"Mariac (or Wellington, as he was named by Captain Stirling), the chief of the country round Raffles Bay and Port Essington, is apparently about thirty years of age, and about five feet eight inches in height. His features are regular, and while he is in good humour, are placid and benign; but on the least displeasure, which arose occasionally from slight causes, they glanced with savage fire. He has evidently much sway among his tribe, as even 'Iniago' (another native) was observed to fall back by a look and word from his chief; though from his possessing a turn for fun and mimicry, and unrivalled dexterity in throwing the spear, he had become a favourite in the camp, to the great annoyance of Wellington, who seemed to view him in the same light that Haman did Mordecai. He gave Captain Barker to understand that presents to any of his

people should only come through himself, and occasionally showed so much ill-humour at deviations from this rule, that Captain Barker thought it prudent to *cut* him for some time. He limped in his walk; but whether from a wound received in foreign or domestic wars I did not learn.

"The natives generally go in parties from six to twelve; Wellington, however, went usually at some distance apart, accompanied by only one. When the settlement was formed, his attendant was Jacama, a 'Manburgee,' called by Captain Stirling 'Waterloo.' Afterwards Iniago had the honour of being his travelling companion, but lost the office from the attention he received in the camp; he was succeeded by Olobs, a 'Mandrogillie,' and as timid as a hare. When we left the settlement, Monanoo, the younger brother of the chief of Croker Island, held this distinguished employment. It is difficult to say whether they are accompanied in their excursions by their women, but it is probable that they are not. As far as we could learn, they never penetrate far into the interior, generally keeping along the shore, and occasionally cutting across any projecting point of land. Their food consists generally of fish, which they spear very dexterously.

"Hunting turtle seems to be a favourite occupation with them, and they appear quite adepts in that, to them, useful art. They also make use of shell-fish, which it may be the business of the women to collect. They do not use the trépang (so desired by Chinese epicures), which is in great abundance all along the coast. They use as food various esculent roots; and cabbage-palm affords an agreeable addition to their usual fare. They are also very fond of honey, which appears to be in abundance, as they were seldom seen in the settlement without a supply of that article, and when they went into the woods on purpose to procure it, they soon returned successful. Their mode of proceeding was, to watch the movement of the bees, which requires a keen eye and long practice, and when they settled to cut the hive down. This operation with their stone hatchets was, although completed much quicker than could be imagined, tedious. It was for this purpose that Waterloo ran away with an axe, after having seen and tried its use, rightly judging that it was far preferable to their own.

"Respecting the number of the natives, there were no means of forming anything like a correct opinion; yet, judging from the rapidity with which they collected on the occasion of one of them being confined for attempting to steal a canoe, it may be supposed that they are by no means thinly spread. On the occasion alluded to, two natives, who had observed 'Luga' confined, left the settlement, and spread the sad tidings. In the evening, 'Wooloogarie' arrived, accompanied by fifty men at arms. The interview was friendly, Luga being punished and at liberty. From the time the two natives left until Wooloogarie's arrival was an interval of six hours; they had to walk two or three miles, and cross and recross a strait two miles wide; they came in three canoes. It

is difficult to know whether they would have acted hostilely had their friend not been released: perhaps they only came to intercede in his favour; and, after the manner of other politicians, thought their request might be better attended to by having a formidable appearance.

"The only warlike weapons that they used, as far as we could learn, were spears, of different forms and sizes, the largest from nine to ten feet long—some serrated, and others headed with a sharp stone. They use the throwing-stick named 'rogarooh,' which is exactly of the same form, and made in the same manner, as that in use among the natives of Port Jackson.

"We could not learn whether they were in the habit of fighting with each other, or with neighbouring tribes; but spear-wounds being by no means uncommon among them, it is probable that in this respect they also resemble their Australian brethren. It is well known that they wage continued war with the Malays, who appeared both to hate and fear them.

"Although it may appear rather paradoxical, yet I do not hesitate to say, that these natives, far from being untameable savages as originally represented, are in reality a mild and merciful race of people. They appear to be fond of their wives and children—at least they talk of them with much apparent affection. They have frequently interposed their good offices in preventing the children being chastised; I have seen them run between the mother and the child, and beg the former to desist from her (as it appeared to them) unnatural conduct, in punishing her own offspring. They are like all other uncivilized people, very irascible, but easily pacified: they require to be managed like children. That they may be taught to distinguish conventional right from wrong was quite apparent; and many instances occurred that showed their aptitude in this respect. Iniago, after having become honest himself, once detected one of his companions endeavouring to secrete a spoon, while they were about to partake of some rice prepared for them; provoked by this ungrateful behaviour, he instantly took it from the delinquent and packed him off, without permitting him to have any share of the food. On first visiting the settlement, a native would invariably pilfer anything that came in his way that he could secrete; which, however, was always brought back by those who knew that such conduct was not countenanced by their civilized visiters: many instances of this kind occurred. They also soon learned to distinguish between a person whose word was to be depended on, and another of no veracity.

"The chief objects of their desire were tomahawks, large nails, and iron hoops; but in the progress of time they took a fancy for various articles of dress—a shirt was a great object for them to obtain; and they became so particular, that if a button was wanting in the collar or sleeve, they were not satisfied until the deficiency was remedied. A coloured handkerchief was also much prized, which they used to roll neatly round the head.

"After they became somewhat polished in their manners, if they

saw anything that struck their fancy, they asked for it; if given them, they showed no visible marks of thankfulness; and if firmly denied them, they laid it quietly down. Some time before we left the coast, they could be trusted implicitly, even with those articles they most highly prized. It may be justly presumed, that living as they do agreeably to nature, they are subject to fewer diseases than man in a civilised state. However, that they are not altogether exempt from the ills attending animal existence, was very obvious. 'During the inclement and wet weather, at the commencement of this year,' observed Dr. Davis, 'a party of the Aborigines was discovered labouring under acute bronchitis, on a low neck of land near the western boundary of Raffles Bay. The symptoms were very severe. During the continuance of the disease they were very abstemious. The only remedies which we saw them employ were (during the severity of the acute stage of the disease) cords tied very tightly round their head, and the frequent pouring of cold water on their heads. On one occasion the chief (Mariac, or Wellington) laid down on the sand, and caused one of his tribe to stand on his head—most probably for the purpose of deadening the acute pain he was suffering. Several of these people have deep circular impressions, on their faces in particular, as if caused by the small-pox. From the want of making myself understood, the nature of the disease which produced these marks was not ascertained.'

"The natives described in language, or rather by signs, 'sufficiently significant,' the history of this malady, which they call 'Oie boie,' and which seems to be very prevalent among them. It evidently bears a resemblance, both in its symptoms and consequences, to small-pox, being an eruptive disease (attended with fever) leaving impressions: it frequently destroys the eyes. I observed more than one native with this mark. I could not learn whether they used any remedy except abstinence. They are also subject to ophthalmia.

"Whether they have any idea of a Superior Being, or of a future state of existence, it was impossible for us to ascertain. It was easy enough to exchange communication as far as regarded objects evident to the external senses; but, as may be easily imagined by those conversant on the subject, any attempt to talk of abstract principles must have proved altogether fruitless and vain. When it is called to mind that the natives were just beginning to lay aside suspicion, and to visit the settlement without fear, not long before it was abandoned, it will not seem strange that these particulars relating to them are so scanty and imperfect.

"It is a curious circumstance that the natives inhabiting different parts of New Holland, although in form, manner, mode of life, and implements of war, they have a striking resemblance, should possess not the least affinity in language. The dialect of this part of the coast is by no means inharmonious; there is an evident difference in pronunciation between the different classes. It is also difficult to obtain the true sound of their words, as it frequently happened that if (the true sound not being caught at first) the word was repeated by

us as nearly as we could guess, they immediately adopted our mode, either through indifference or complaisance; and it required some pains to obviate this apathy or over-politeness."

Raffles Bay is in the same parallel with Port Essington, and thirteen miles east of it. It was named by Captain King, in 1818. The latitude is 11° 12′ 30″ S. and the longitude 132° 26′ E. It is of a circular form, the diameter being about three miles. The bay is very shallow, having only from three to four fathoms water; and along the whole of its eastern side it is shoal to the distance of three-quarters of a mile from the shore, having at low water about a fathom at that distance; on the western side the water is deeper, the shore having steep banks; on the eastern side the shore is very low, with mud-banks in front of it. There is a great deal of mangrove around Raffles Bay; the land is similar to that of Port Essington, but not quite so elevated; and from the circumscribed dimensions of the bay, its shores are not so much refreshed by the sea breezes as those of the neighbouring port. The entrance to the bay is a mile and a half wide, and easy of access: but there is a sunken reef three miles north of the entrance, and two miles distant from the western shore. The vessel in which I was touched upon it when going out of Raffles Bay; this reef, therefore, demands caution from vessels going out or in. The entrance is also a little concealed by Croker's Island (for vessels approaching from the eastward), and cannot be discovered by ships coming from the west until that island is approached within two miles.

The land round the settlement is low, but dry and well-wooded; there is no mangrove close to it (although there is much of this along the southern side); and there is a long, open sandy beach in front, where there is good fishing with the seine. The soil is similar to what I have described in Port Essington and Melville Island.

There were no traces of the Malays in Raffles Bay when I visited it, but afterwards they made their appearance. Two or three proas were induced to enter, and had some repairs done to them; whilst many others, not knowing there was a British settlement in that port, passed within sight, on their way to Bowen's Strait. The following year, however, (1828) many more ventured, glad of being under protection of the British, as their dread of the natives had formerly always deterred them from landing in Raffles Bay. Sometimes, during the north-west monsoon, ten or twelve proas have been seen passing in the course of a day, entering Bowen's Strait.

The objects of natural history being the same as at the two former places, I shall pass them over in silence.

The climate is also the same; but the locality being drier, freer from swamps and mangroves, and more open to the sea breezes, was not so injurious to health as that of Melville Island. When the serious attack of scurvy (which I before mentioned) had subsided, the settlement continued tolerably healthy until it was given up. It was only retained two years; the population was generally about seventy, and seven or eight deaths took place. It is probable there would have been more, had not fourteen very bad cases been removed from it in November, 1827, and a few others in May, 1828. Scurvy and ophthalmia were the prevailing diseases, but I cannot take upon myself to say what others appeared.

With respect to the management of live stock at Fort Wellington, I did not hear that the buffaloes suffered so much after being imported, as they did at Dundas; and the pigs fattened well by feeding on roots which they found in and about the swampy ground. The marshy flats near Fort Wellington were dry during part of the south-east monsoon, and never very deep, so that the pigs could easily grub throughout them; but on Melville Island the marshes were several feet deep, and never dry; there, accordingly, the pigs were only fat when house-fed.

Both Raffles Bay and Melville Island were abandoned in the same year (1829); and I shall conclude this memoir by offering a few remarks on the occupation of the northern coast of Australia. At present (1834), that part of the territory of this extensive continent extending from Morton Bay on the east coast, to Swan River on the west, and embracing all that part of Australia to the northward of twenty-five degrees of south latitude, is not only without any single point of it being occupied, but a great part of its coast (to say nothing of the interior) still remains to be surveyed. This line of coast, measuring an extent of upwards of three thousand one hundred miles (if reduced to a straight line), possesses no good harbour (as far as has yet been asertained), with the exception of that admirable one I have described on the Cobourg Peninsula. This port is a central situation on the extent of coast alluded to; it is the most prominent part of that coast, and the most northern point of Australia (Cape York excepted, which is in latitude 10° 37′ south). The coast to the westward of it, as far as 20° south, and even farther, is a dangerous and inhospitable one, on account of the numerous islands, reefs, and shoals which lie along it, with extraordinary and perplexing currents running amongst them; whilst the coast to the eastward, as far as Endeavour Strait, although probably more safely approachable, yet presents no harbour of consequence; and if it did, they would be too far to the eastward to be conveniently situated for commencing a trade with the eastern seas.

Port Essington is as the friendly hand of Australia, stretched out towards the north, openly inviting the scattered islanders of the Javanese, Malayan, Celebean, and Chinese seas, to take shelter and rest in its secure, extensive, and placid harbour; where they may deposit the productions of their native inter-tropical isles, and receive in exchange the more improved manufactures of the natives of the temperate zone. If settled by some civilised nation, and well provided with such European goods as are known to be in great demand by the inhabitants of the eastern seas, it would soon attract their attention. The Bugis from Celebes, and the traders of other islands in those seas, at present resort to Sourabaya, Penang, Singapore, Delhi, and Coipang Timor, for such articles of supply as are required throughout the Archipelago. They make a trading voyage both going to and returning from these places, touching at the different islands on their way in the central and eastern part of the Archipelago—such as Mandar, Kaili, Macassar, Boniati, New Guinea, Timor, Ceram, Sandalwood, Flores, Balé, Borneo, and many others. They pick up the produce of those islands, as also the produce of the fisheries on the coast of New Holland, and exchange them at the Dutch, English, and Portuguese colonies, for European goods. The exports of tripang, from Macassar, for the China market, according to Mr. Crawford's calculation, amount annually to seven thousand peculs*; and sell at from twenty to one hundred and twenty dollars a pecul. Of pearl shell, according to the same author, there is exported annually to China, viâ Singapore, five thousand peculs, at fourteen dollars a pecul. Tortoise-shell, cowries, and shark-fins, also sell well in China; the latter selling at thirty-two dollars a hundred weight. The tortoise-shell alone which was brought to Singapore by the Bugis in one year (1826), and sent from thence to England, amounted to sixteen thousand pounds weight: the bark of two species of mangrove also sells well in China.

I have particularised those articles in order to show how valuable a part of the traffickable commodities of the Bugis traders is to be found on the northern coast of Australia and its neighbouring seas. The sea around the island of Timor, and as far south as latitude 26°, abounds with the spermaceti whale; and the whalers employed in that fishery, and on the north coast of New Guinea, at present resort to Delhi and Coipang for supplies and refreshment. According to Mr. Crawford's account, there are 32,000 tons of shipping, and 3200 seamen, employed in this fishery. Now, so fine and convenient a harbour as that of Port Essington would certainly be a most desirable place of rendezvous for these whalers, particularly during a time of war.

* A pecul is 130 pounds weight.

At present, a great many vessels go from Port Jackson to Manilla, Singapore, and Sourabaya, in search of cargoes for the European market, and load their ships with Chinese goods and the produce of the Indian islands, deposited at Singapore and Sourabaya by the Bugis and other traders of the Archipelago. The articles brought from the Indian islands (many of which are exported to Europe) are cloves, nutmegs, mace, pepper, rice, cotton, oil, indigo, tamarinds, betel-nut, gambier, antimony, cassia, ratans, dragon's blood, cane, sapan-wood, turmeric, mother-of-pearl shell, tortoise-shells, sandal-wood, ebony, sago, bees-wax and honey, benzoin, ivory, camphor, benjamin, birds of Paradise from New Guinea and islands near it, striped and tartan cotton cloths from Celebes, gold dust and gold and silver bullion, and many other articles.

For the China market, particularly, they bring tripang, tortoise-shell, mother-of-pearl, shark-fins, birds'-nests, mangrove bark, eagle-wood, hides, and a sea-weed called agar-a-gar. The European commodities which are exported in return, for the supply of the central and easternmost islands of the Archipelago, consist of chintzes, cambrics, printed and white cottons, gaudy-coloured handkerchiefs, bandanas, velvets, broadcloths, iron and steel (both unwrought and manufactured), fire-arms and gun-powder, earthenware, and glass.

If a depôt of these articles was established in a convenient place on the north coast of New Holland, such as Port Essington, the Bugis traders would there find it easy to dispose of their cargoes in exchange for the commodities they require; and as the distance from Celebes to the Cobourg Peninsula is only about 760 miles—whereas the distance from that island to Singapore is 1200 miles—it would appear to me to be more convenient for them to resort to Port Essington, than either to Java or the Straits of Malacca; and likewise, by the distance being much shorter, they might be enabled to supply the purchasers of their European commodities at a more reasonable rate than they do at present. The cost just now to the consumer is from 150 to 200 per cent. on the prime cost. The Macassar fishermen who came to the coast of New Holland, said, that Macassar was badly supplied with the necessary marketable articles; and what could be procured were sold at exorbitant prices.

As the maritime undertakings of the inhabitants of the Archipelago never extend beyond the influence of the periodical winds, and they are averse to venturing far from land, Port Essington is the only port of New Holland that they can be expected to carry on a traffic with. The Chinese proceed on a similar principle; and as, by the regularity of the monsoons, their junks come to Macassar, Coipang, Timor, and Sourabaya, it

may be reasonably expected, that, with the certainty of finding a market, they would venture also a few hundred miles further, and would prefer a British port to either Dutch or Portuguese. The Chinese junks reach the coast of Java, from Canton (a distance of 1800 miles), in fifteen days; the distance from the centre of the north coast of Java, or about Samarang to Port Essington, is 600 miles; so, with the same rate of sailing, they could reach Port Essington in five days more; and they would have a fair wind all the way—the north-east wind blowing in the China seas, and the north-west wind prevailing to the south of the equator at the same season, that is, from November to April. Several Chinese junks trade to Macassar, and I should imagine that their owners would be glad to send them five or six days further sail to Port Essington, provided they could there find an exchangeable medium for the productions of China and be supplied with European goods.

Having thus shown the advantageous position of Port Essington, with respect to the Indian Archipelago, in a commercial point of view, and stated that a great many ships go from Port Jackson to look for cargoes at Manilla, Singapore, and the ports of Java, on their way to the two latter places, frequently passing through Torres' Strait and within a very short distance of Port Essington (probably thirty or forty miles)—may it not be presumed, that if the scattered productions of the Archipelago and China were concentrated and deposited in Port Essington, as they are now at Singapore, that it would be a great advantage for our ships to proceed there for cargoes, and thereby save much time in their return to Europe, avoiding the lengthened voyage, and shortening their return home by 1700 or 3600 miles?* The staple produce of Timor, within a few days' sail of Port Essington, would most probably flow into it, as exchangeable articles: consisting of bees-wax and honey, rice and Indian corn, sandal-wood, and copper. I, however, do not know that copper is exported from Timor, but it is found there.

Vessels sailing from Port Jackson can pass through Torres' Strait during the months of May, June, July, August, and September; but during the rest of the year, hazy weather and contrary winds render that passage impracticable. Vessels approaching Port Essington from the westward should pass through the Straits of Samoo, by which the shoal towards the west end of the Great Sahul Bank is avoided. This approach is open at all times of the year, although, of course, the run from the Straits of Samoo to the Cobourg Peninsula may be accomplished in three days

* Singapore is fourteen degrees more to the northward than Port Essington; and the north part of Luconia, round which ships generally go to Manilla, from Port Jackson, is thirty degrees more to the northward; which will account for the difference of distance alluded to.

during the north-west monsoon, and will take seven or eight days during the opposite monsoon.

A second advantage which would arise from the occupation of Port Essington would be the facility it would afford, from its central situation, to any future minute survey of the coast to the westward and eastward, as also for exploring the interior of this extraordinary country, from the north; thereby adding to our geographical knowledge, and probably opening a new field in the science of natural history.

From its contiguity to New Guinea (which island is only 540 miles distant), it might possibly, at no very distant period, carry on a lucrative trade with it also. As its barbarous people become civilized, they will require clothing, utensils, and every manufactured article in use by their more cultivated neighbours of the islands to the west of them; and the satisfaction of introducing the arts and comforts of civilized nations amongst these unenlightened people, as also amongst the islands to the south-east of New Guinea—as New Ireland, New Britain, Solomon's Isles, New Hebrides, and New Caledonia—will devolve upon whatever nation establishes a well-appointed settlement on the northern coasts of Australia. There are some fine islands also in Torres' Strait, where some small establishments for fishing and taking turtle might be detached from the principal depôt; and they might contribute materially towards facilitating the safer passage of ships through those straits, the approach to which is attended with much danger, and demands great caution.

In a military point of view, Port Essington also possesses advantages: it commands the passage from the South Seas, through Torres' Strait, to the Indian Ocean; it would be a rendezvous in time of war for all vessels trading in the Indian Archipelago; it would be a place of refreshment for our ships of war, on their way from Port Jackson to India between May and October, and a place of call for vessels conveying troops to India from Sydney during the same season. It would also be a rendezvous for our whalers in the Timor Seas and amongst the Polynesian Isles; and would ultimately become the capital of Northern Australia. Its locality is well adapted for the construction of defensive works, and a few would suffice for the protection of the entrance.

If Port Essington should ever be settled, it must eventually carry on a commercial intercourse with Asia, China, and the intermediate islands; and if agriculture is carried on in the Cobourg Peninsula, as it would be, provided the Chinese and Malays were encouraged to settle there, its productions being different from those of Europe, would afford other exchangeable media for our manufactures and productions.

When I was in the Timor and Javanese seas, in 1829, I heard of several instances of quarrels having taken place between the Indian Islanders and the masters of small European traders, as also the misconduct of some of those captains of vessels, in their intercourse with the islands of the Archipelago: these misunderstandings arising generally from the European trader not being acquainted with the customs of the Islanders in their modes of barter or sale. Such occurrences as these also tend to confirm me in a belief that a more profitable intercourse would be carried on with the Indian islands if a central depôt was established, and the intermediate intercourse carried on between this depôt and the islands by the native traders themselves.

In conclusion, I shall introduce an extract from Mr. Crawford's excellent work on the Indian Archipelago; and this gentleman was most intimately acquainted with the resources and habits of those islanders, as well as with the productions and the manner of trading in the islands:—

"In order to carry on an extensive intercourse with the Indian islands, a colonial establishment becomes the only means of effecting this object. Such a colony should be situated in the direct route between the most civilized tribes of the Archipelago, and in the track of the navigation between the great nations of the East and West. The harbour should be good, and the land fertile: a free trade, liberal administration, and such a degree of regular government as would ensure security of persons and property, will inevitably ensure a large share of success.

"There ought to exist the most unbounded freedom of commerce and settlement to persons of all nations and religions; and a pure and impartial administration of a code of laws, suited to the state of such a colony, and adapted to the peculiar character of its varied population, should form the most important branches of the administration. A moderate impost on external commerce—which that commerce well protected should certainly afford—with the sale of public lands, and an excise on vicious luxury, would afford a sufficient revenue to defray the expenses of government and the charge of public works.

"Such an establishment would become a great emporium; the native trader would find it the best and safest market to repair to; and the scattered productions of the Archipelago would be accumulated and stored in it for the convenience of the distant and inexperienced trader of Europe. The European voyager would find it the best market for his goods, and the sacrifice of a great nominal profit would be compensated by the expedition with which his business would be dispatched, and an immunity from those dangers and risks to which inexperience must necessarily commit him, in a direct intercourse with the natives."

VII.—*Extracts from a Spanish MS. giving an Account of certain Expeditions undertaken by Order of the King of Spain, between the Years 1749 and 1776, and of the Establishment of a Colony on the Island of Juan Fernandez.* Communicated by Woodbine Parish, Esq., F.R.S. Read 9th June, 1834.

THE notice which has appeared in the March Number of the bulletins of the French Geographical Society respecting a voyage performed in 1774 by the Spanish ship Jupiter has induced me to believe that some further account of the history of that voyage, and of some other undertakings by the Spaniards in previous years, to make themselves better acquainted with the southern shores of the Pacific, may be worth recording, tending, as they do, to complete the chain of our historical notices of the voyages of discovery in those seas, and affording, what cannot but be interesting to us in a national point of view, a striking evidence of the effects produced upon other nations by the enterprising spirit of our own navigators.

The Spaniards were not altogether so indifferent to the progress of maritime discovery in the last century as has been generally believed. Alarms for their own interests did occasionally rouse them, and, as will be seen, the publication of the voyages of our own great navigators stimulated them to exertions of which, till now, we have been in ignorance.

The history of some of those alarms, and of the measures which followed them, is given in the following passages extracted from a MS. report in my possession, drawn up by Don Manuel de Amat, the Viceroy of Lima, for the information and guidance of his successor in that government, in 1776. In an abstractly geographical sense they perhaps contain nothing new to us; but, as I have above stated, I think there are other grounds on which they may be deemed to be of interest.

Cook, on his last voyage, found traces of the visits of the Spaniards to Otaheite; and the accuracy of his account of them, so far as it goes, is strikingly corroborated by the Viceroy's narrative.

In point of date, the first proceedings of the Spaniards of which the Viceroy makes mention, may be referred to Commodore Anson's voyage, the account of which appeared in 1748. He says:—

"By communications from the Court dated in May 1749, we were confidentially apprised that the British Government projected forming a settlement either on the island of Juan Fernandez, or in the archipelago of Chonos, in consequence of the reports made by Commodore Anson on his return from those seas of the great advantages which might be expected from such an establishment. The king, naturally alive to the consequences of such a project on the part of the English, and seeing how detrimental

it might prove to the peace and quiet of his majesty's dominions in these parts, desired that a ship-of-war should be immediately despatched to examine the said islands, as well as all the coasts to the southward, with orders to expel any foreign ship whatever which might be met with in any of the ports or possessions of his majesty in these seas. His majesty commanded that the island of Juan Fernandez should be peopled, and a suitable garrison immediately established there for its protection; and that further the archipelago of Chonos should be also carefully examined, and a survey made of all the ports and harbours found there; and that at the island of Inchin, described in Anson's voyage, a fort should be built and a garrison established sufficient to prevent any other occupation of it.

"In proceeding to inform your Excellency how these orders were executed, I shall commence with the islands of—

"*Juan Fernandez.*—These islands are two: the one called by us *de tierra*, generally known as Juan Fernandez, in 34° latitude, may be six or seven leagues in extent; the other is called *mas à fuera*, and lies about twenty-five leagues from the former in the same latitude. The first is convenient enough, and capable of subsisting a small population, although the extent of the lands fit for cultivation is inconsiderable; but *mas à fuera* is but a heap of rocks, where it is difficult to land, and still more so to find means of subsistence: there is, however, a great abundance of fish, especially of cod, which might prove a very valuable fishery to us, if our people would employ themselves in it.

"No time was lost in establishing a settlement on Juan Fernandez, conformably with the king's orders: besides the garrison, consisting of a company of infantry and the necessary staff, with twenty-two prisoners condemned to hard labour to assist in the works, 171 persons of both sexes, and of various ages and occupations, were safely landed, with cattle, mules, sheep, and a variety of poultry of all sorts, as well as a suitable supply of seeds and agricultural implements: eighteen guns were also sent for the fort. But this little colony had not long been settled when it was almost totally destroyed by the same dreadful earthquake which in the year 1751 overthrew the city of Conception in Chili: with the earthquake the sea rose, and overwhelmed the houses, most of which had unfortunately been built upon the sea-shore: thirty-five persons perished from this calamitous event, and amongst them the Governor with his wife and all his children. The President of Chili sent such relief as he could to remedy this disaster, and the settlement was rebuilt by my orders in a more convenient and safe position, further removed from the sea, under the superintendence of Don Manuel de Castel-blanco.

"On the rupture with England, in 1762, the President of Chili

would have withdrawn the garrison and broken up the settlement, had I permitted it; but I considered it our duty rather to reinforce it with an additional company of infantry and such a supply of ammunition as would enable it to make a vigorous defence if necessary, of all which the king was pleased highly to approve. I was guided in this by recollecting the extreme distress in which Commodore Anson reached those islands; and that, destitute as he was of all succour, and his crews utterly helpless and reduced by sickness, he must have surrendered to any force we might have had there at the time; whereas from the want of such a force on our part, he was able to refit his ships and restore his invalids, so as afterwards to do the greatest injury to our interests in those parts—reasons, it appeared to me, sufficient to show the impolicy on our part of abandoning such a position.

"The expense of the settlement to the king, according to the estimates for the year 1753, was about 12,640 dollars.*

"*The Archipelago of Chonos* was examined as carefully as possible, in obedience to the same orders from his majesty.

"This group of islands lies in 45° and 46° of latitude, between the isles of Chiloe and Cape Tres Montes: from the circumstance of the Anna pink having been driven in, and having found shelter and refreshment there, Anson has given some account of this archipelago, which he considers would be a convenient position for a settlement, especially the island of Inchin: but our people, sent to examine the said islands, and who remained there some time, after a careful survey, especially of Anson's Inchin, were entirely satisfied that they might be safely abandoned as holding out no inducement whatever to any foreign nation to settle there, being entirely barren, frigid, and uninhabitable. The island of Inchin is known to the sailors on the coast of Chili by the name of Tequegen, and is occasionally frequented by the Indians of the neighbouring continent for the fish taken there: the English seized one of the boats of these Indian fishermen, and on asking

* Carteret appears to have been the first of our navigators who noticed this settlement. He gives the following account of it:—"10th of May, 1767, we made the island of Juan Fernandez. As I did not know that the Spaniards had fortified this island, I was greatly surprised to see a considerable number of men about the beach, with a house and four pieces of cannon near the water side, and a fort about 300 yards further from the sea, just upon the rising of a hill, with Spanish colours flying upon the top of it. The fort, which is faced with stone, has eighteen or twenty embrasures, and within it a long house which I supposed to be barracks for the garrison. Twenty-five or thirty houses of different kinds are scattered round it, and we saw much cattle feeding on the brow of the hills, which seemed to be cultivated, as many spots were divided by enclosures from each other." I hoisted no colours, having none but English on board, which at this time I did not think proper to show. As I was disappointed of wood and water at this place, and of the refreshments, of which, after the dangers and fatigue of our voyage through the Straits, and our passage from it, we stood in the most pressing need, I made all the sail I could for the Island of Masafuera.—Vide *Hawkesworth's Collection.*

how they called that island, were answered *Inchin*, which signifies in their language *It is ours;* and this mistake in the question put to them gave rise to the name given to it by the English.

"*The Islands of Chiloe* are of much greater consequence, and I consider them as the key to the King of Spain's possessions in the Pacific. In the year 1767," observes M. de Amat, "I was so impressed with this opinion that I thought it my duty to state to His Majesty that if the English had any further views of establishing themselves in these seas, there was no point so suitable for them as upon these islands; and I in consequence received His Majesty's commands to fortify the port of Lacuy, to send there a political and military governor with an allowance of 4000 dollars per annum, and to take every measure requisite for their security and protection. In former times they were subject to the Captain-Generalship of Chili; but considering the impediments to their communicating by land with that government, on account of the hostility of the intermediate Indians, and the want of opportunities by sea with Valparaiso, I thought it better at once to make them a direct dependency of this government of Lima, through which they received their succours and orders from Spain; an arrangement of which the king was pleased to approve by his royal letters of the 15th of October, 1768.

"These islands were first peopled by us in about 1565-9, during the government of Don José Garcia de Castro, in Peru, from whom the principal place takes its name of Castro. To the north, they are separated from Valdivia by the savage Indians who inhabit the intermediate coast; to the south lies the archipelago of Chonos and that chain of islands which extends to the Straits of Magellan. On the continent opposite, a Mission formerly existed, called Nahuilchuapy, for the reduction of the Indians to the Catholic religion, but it was destroyed by the savages, who put the missionaries to death.

"The principal entrance to this archipelago is in latitude 42°, and runs to 44°, where it is lost in another and wider channel. The population may be from 12 to 14,000 souls, of which about 2500 may be capable of bearing arms. The fortified places are Castro, St. Carlos, Chacao, Calbuco, and Maullin. The inhabitants grow wheat, maize, barley, and flax; but their principal food is the potatoe. The islands abound in useful timber, suited to ship-building. Cattle is scarce from the want of pasturage, but there are vast numbers of hogs: there is also plenty of fine fish, which might be turned to good accouht; and if the people were enterprising, they might make much of the numerous whales which resort to their coasts.

"The expense of the king's troops is annually about 26,883 dollars for the defence of these islands."

The visit of Byron to the Falkland Islands in 1765, and the still more formal occupation of those islands by Captain Macbride in the following year, seem to have confirmed the previous suspicions of the Spaniards as to the designs of the British Government to establish themselves in the South Seas. It was reported, that, not satisfied with the settlement on the Falklands, they had formed another on the coast in front of the islands of Chiloe; and the Viceroy states, that in consequence of these rumours, he was again ordered to examine all the ports and harbours to the southward, and to drive out the English wheresoever they might be found. An expedition for this purpose was accordingly fitted out, and sailed from Callao in October, 1770. No British settlement was discovered; and the further survey of the Chonos Islands only confirmed the opinion previously formed, of their total unfitness for any settlement whatever.

With these expeditions the Spaniards would probably have rested satisfied, but for the return of Cook from his first voyage, and the accounts circulated in Europe of the islands he had visited in the Pacific Ocean, especially of Otaheite, which appear to have excited no inconsiderable jealousy in Spain. Captain Cook returned in June, 1771, and in the following October orders were sent out to the Viceroy at Lima, accompanied by all the notices which could be collected as to the late British discoveries, to send an expedition immediately to examine the Society Islands, and particularly Otaheite, and to report upon the probable utility of those islands, their general state, resources, and population; and this measure was hastened by intelligence that the Resolution and Endeavour were again equipping in England to return to Otaheite, as was believed in Spain, to take formal possession of those islands in the name of his Britannic Majesty.

The Viceroy, referring to these orders, proceeds to relate, "that upon receipt of them, he fitted out the Aguila frigate under command of Don Domingo Bonechea. The Aguila sailed from Callao on the 26th of September, 1772, and reached Otaheite on the 10th of November following. On her return she was forced, on the 26th of March, 1773, to put into Valparaiso in a very crazy state, having been out just six months from Callao."

"Captain Bonechea made a most favourable report of the people of the Society Islands, by whom he had been kindly received and treated, in return for the presents he had taken out for them. He stated that no foreign power had as yet formed any permanent establishment either at Otaheite or in any of the adjacent isles; but he was told by the natives that the English had visited them a few months before his arrival. He brought away in the Aguila four of the natives, one of whom died at Valparaiso, and a second

afterwards at Lima; the other two the Viceroy ordered to be well clothed and carefully attended to in his own palace, that, upon their return, as he says, they might be able to impress their countrymen with proper notions of civilization, and of the benevolence of the Spaniards. The whole of Bonechea's journals and observations on this voyage were forwarded to the King of Spain, in April 1773, together with a variety of specimens of the productions of the islands he had visited, and of the works and manufactures of the natives, proving them to be far from so uncivilized as might be supposed, and showing," says the Viceroy, "what useful dependents they might be made of the King of Spain. I could not," he adds, "but at the same time strongly express my own opinion to his majesty as to the great prejudice which would result to his dominions in these seas if any other power were permitted to take previous possession of them; and the King, concurring in these views, sent out instructions, in October 1773, again to dispatch Captain Bonechea in the Aguila to make a more careful survey of Otaheite, and to report how far it might be desirable to form a Spanish establishment there. Captain Bonechea, in consequence, again sailed from Callao on the 20th of September, 1774, and reached Otaheite on the 27th of November. He had on board two Franciscan missionaries, Father Geronimo Clota, and Father Gonzalez, as well as the two natives brought away on the former voyage. In company with the frigate went the Jupiter, commanded by Don José Andia y Varela, carrying out a portable house, a linguist to be left at Otaheite with the missionary fathers, some sheep and cattle, and an assortment of seeds and implements.

"In about 260° longitude from Teneriffe*, they fell in with vast numbers of birds of various species, and shoals of flying fish.

"Bonechea found the harbour of Tallapura inconvenient; but at Tatou-tira (Owhatow-tira) the ships had excellent anchorage: this port lies in 17° 45′ latitude, on the south-east side of the island. According to his account, the island of Otaheite may be generally described as resembling a figure of 8: it is from thirty-five to forty leagues in circumference, mountainous, and much covered with wood; the water found there is excellent.

"The complexion of the inhabitants, though in some fairer and in some darker than in others, is generally of an olive cast; from which and from the great similarity in the customs observed in the various islands examined in these seas, the Viceroy infers that the inhabitants are from one and the same common origin—most probably Asiatic, and deduced through those various groups of

* About 117° W. of London. The Spaniards estimate their longitude round the globe by the east.

islands which, on a reference to the chart, will be found to extend continuously between the equinoctial line and the tropic of Capricorn, from the Moluccas to the centre of the Pacific.

"In their religious notions and ceremonies, the Otaheitans were found to be extremely superstitious and particular; but their chiefs, whom they call *eries*, are absolute rulers, with power of life and death over their vassals—a state of things," the Viceroy observes, "which may conduce much to facilitate the introduction amongst them of the Catholic faith. The numbers of these people could hardly be estimated without a careful survey of the interior of the island. They breed pigs and dogs, for which they have a high value, and a small sort of domestic poultry; they have besides an abundance of wild fowl in great variety.

"The plantain and walnut-tree were found there, with many unknown fruits of an agreeable taste, and cocoa-nuts equal to those of Guayaquil: the sugar-cane also, but the inhabitants did not appear to understand its uses. The climate in general was humid and warm.

"The Otaheiteans are expert in the management of their canoes, in which they pass from one island to another: they use sails made from the bark of the palm-tree.

"Unfortunately, in the midst of his investigations Captain Bonechea fell sick and died: he was buried on the 26th of January, 1775, by the missionary fathers, at the foot of a cross which they had erected on their first landing. His loss was irreparable, and the frigate returned to Callao, arriving there six months and eighteen days from her departure. The Jupiter also came in a few days afterwards, bringing four more of the natives, who were as kindly received as their countrymen had been previously.

"The result of this voyage was the examination of twenty-one islands, nine of which were low, and the others lofty. A particular account of them, as well as the track of the frigate correctly laid down, and all the details of the interesting expedition, were immediately forwarded to Spain.

"In a few months," the Viceroy states that, "becoming anxious to learn the fate of the missionaries, and their progress amongst the natives, he determined to send the Aguila back again. She sailed accordingly on a third voyage the 27th of September, 1775, under the command of Don Cayetano de Langara, of the Royal Navy. One of the natives brought away by Bonechea returned in her, but nothing could induce his companion (the other two had died) to leave Peru.

"Captain Langara was made fully acquainted with the king's views, and received his instructions and orders accordingly. With respect to the missionaries, he was to ascertain whether they were willing to remain or not in their avocation; and, in any event, he

was to receive from them all the information they had been able to collect.

"The Aguila was out upon this voyage 143 days: she reached the port of Tatou-tira in thirty-six days, remained there ten, and was at Callao again on the 17th of February, 1776; having followed much the same track as on the preceding voyage.

"On reaching Otaheite, Captain Langara found a positive determination on the part of the missionaries not to remain there. In vain he exerted himself to induce them to recollect their particular vocation, and to persist in the glorious work they had been sent upon, viz., the conversion of the infidels to Christianity. Fear seemed to have taken the place of all that holy zeal which ought to have animated them, and they were obstinate in their resolution to give up entirely their original pious undertaking. Nothing but a Spanish garrison in the place would have been sufficient to induce them to stay where they were. They had made not the slightest progress in the conversion of the natives, of whom they lived in continual dread; and this appeared the more strange, since the linguist, who had been alone over every part of the island, declared that the people everywhere showed the most docile and amiable disposition, and were marked in their expressions of respect for the fathers. He reported, that the island was well peopled, and that the inhabitants, as far as he could judge, could not be fewer than 150,000; that they were governed by two principal Eries or chiefs, having others subordinate to them; the one rules on the western side of the island, called Opuré, the harbour of which is Matauvai, where the English astronomers had passed some time, giving the natives sheep, goats, dogs, pigs, cats, and geese: they had also distributed amongst them coloured cloths and a quantity of small gilt medals, dated 1772, having on one side the likeness of their king, George III., crowned with laurels, and on the other, two ships on the seas. The other principal Erie resides on the opposite side of the island, near the port of Tatou-tira, where the portable house of the missionaries was erected. From this chief, as well as from his wife and all his people, the fathers had experienced every kindness; and when their intention to go away was known, they showed their grief in the most marked manner, being only consoled with the assurance that they would speedily return amongst them. To satisfy them on this head, the portable house and its contents were, in the mean time, recommended to their especial care.

"The missionaries had been frightened at witnessing the sacrifices made by these people to their gods, for the health of their Eries. Not content, it appears, with offering up animals, they did not hesitate also to sacrifice human beings at the shrines of their Eatua or divinities. The same barbarous ceremonies, it was

understood, were practised on the succession of their chiefs, whose power is hereditary, and whereby it was supposed that their good and prosperous government was ensured.

"Nevertheless, and in spite of these idolatrous practices, these people have very proper notions of right and wrong, and believe in the immortality of the soul; and although they were perfectly acquainted with the character of our missionaries, it did not appear that their heathenish customs in any way prevented their treating them with great kindness and respect. In fact, excepting some trifling instances of theft, from which these people can with difficulty refrain if temptation be thrown in their way, the fathers had no cause to complain; and even in these instances, the offenders were almost always denounced, and on complaint to the Erie, the stolen articles were returned, and the delinquents would have been thrown into the sea, had not the fathers interceded to save their lives.

"It is evident, however," observes the viceroy, "that those selected for the conversion of such infidels should be either endowed with the ardour and constancy of our holy apostles, or at least should be possessed of such a knowledge of some of those useful or mechanical arts of which these idolaters are ignorant, as might ensure for them such a measure of esteem and influence as would mainly assist them in the propagation of the doctrines of Christianity and civilization. Such qualifications," he adds, "would certainly produce a strong impression upon these people, who might thus be brought, without much difficulty, to embrace the Catholic faith.

"Captain Langara received some account of another island, of some importance, called Orairoa (either Roggewin's Carlshoff, or Byron's Isle of Disappointment—according to Forster, *Orimaroa*), distant from Otaheite, in a N.N.E. direction, about forty leagues, from some of the natives, who had fled to Otaheite after a battle, in which they had been defeated by their enemies. They said that the English ships had been also there; and they reported, amongst other things, that pearls were found there, but our people saw none of them."

Cook's account of these visits of the Spaniards to Otaheite is as follows. In the narrative of his Second Voyage, in 1773, he says:—"Soon after our arrival, we were informed that a ship, about the size of the Resolution, had been at Owpaiurua Harbour, near the south-east end of the island, where she remained about three weeks, and had been gone about three months before we arrived. We were told, that four of the natives were gone away in her, &c. &c.

"At this time we conjectured this was a French ship, but on our arrival at the Cape of Good Hope, we learnt she was a

Spaniard, which had been sent out from America. The Otaheitans complained of a disease communicated to them by the people in this ship," &c. &c.

On reaching Otaheite, in 1777, on his third and last voyage, Captain Cook says, "he was then told by the natives, that two ships had twice been in Oheitepeha Bay since his last visit to the island in 1774, and that they had left animals there, such as the English had on board: but, on further inquiry," he adds, "we found they were only hogs, dogs, goats, one bull, and the male of some other animal, which, from the imperfect description now given us, we could not find out. They told us, that these ships had come from a place called *Reema;* by which we guessed that Lima, the capital of Peru, was meant, and that the late visiters were Spaniards. We were informed, that the first time they came, they built a house, and left four men behind them; viz., two priests, a boy or servant, and a fourth person, called Mateema, who was much spoken of at this time: carrying away with them four of the natives: that in about ten months the same two ships returned, bringing back two of the islanders, the other two having died at Lima; and that, after a short stay, they took away their own people, but that the house which they had built was left standing.

"I found it (the house) at a small distance from the beach; the wooden materials of which it was composed seemed to have been brought here ready prepared to be set up occasionally, for all the planks were numbered; it was divided into two small rooms, and in the inner one were a bedstead, a table, a bench, some old hats, and other trifles; of which the natives seemed very careful, as also of the house itself, which had suffered no hurt from the weather, a shed having been built over it. At a little distance from the front stood a wooden cross, on the transverse part of which was cut the following inscription,—'Christus vincit:' and on the perpendicular part (which confirmed our conjecture that the ships were Spanish)—'Carolus III. imperat 1774.' On the other side of the post, I preserved the memory of the prior visits of the English by inscribing,—'Georgius Tertius Rex, annis 1767, 1769, 1773, 1774, and 1777.'

"The natives pointed out to us, near the foot of the cross, the grave of the commodore of the two ships, who had died there while they lay in the bay the first time: his name, as they pronounced it, was Oreede. Whatever the intentions of the Spaniards in visiting this island might be, they seemed to have taken great pains to ingratiate themselves with the inhabitants; who, upon every occasion, mention them with the strongest expressions of esteem and veneration."

VIII.—*Observations on the Manners of the Inhabitants who occupy the Southern Coast of Arabia and Shores of the Red Sea; with Remarks on the Ancient and Modern Geography of that quarter, and the Route, through the Desert, from Kosir to Keneh.* Communicated by James Bird, Esq. Read June 23d, 1834.

As steam-communication, between India and this country, has become a subject of public inquiry, the latest information regarding the people of southern Arabia, and along the shores of the Red Sea, may be of interest to the members of this Society. I am indebted to others for some of the geographical facts which I here communicate; and the remainder of this paper is the result of personal observation and inquiry among the Arabs.

In the afternoon of the 10th of January, 1833, I embarked on board the Hugh Lindsay, government steamer, which was now to perform her fourth voyage to the Red Sea; and, early in the morning of the 20th following, first saw the high land on the Arabian coast, which lies to the eastward of Ras Sharwín or Kisín point. At 9 A.M. we had advanced within twenty-five miles of the shore, and observed that the whole of this coast is bold and mountainous. It appeared at first sight to closely resemble the shores of India; but a nearer view soon convinced us that we had been deceived. The mountains, which rose to the height of two or three thousand feet, presented, here and there, the flat tabular appearance of the trap formation, with that scarped and fortified aspect which characterises the hills on the Dekhan coast, but without a tree or mark of verdure, without even the stunted brushwood which covers and gives beauty to the most barren of those on the Indian shore; sterility claiming this dreary region as its own. The eye of the observer ranges in wonder over this country, where the depth and ruggedness of the ravines, that descend to the ocean, convey to him an impression that desolation here reigns triumphant.

The two vertical pillars which crown the mountain ridge near Ras Sharwín, and are named Asses' Ears, on account of their fancied resemblance, were soon left behind, while the steamer continued her course through the now smooth sea; and early on the morning of the 21st our anchor was cast at Mukallah. This port, since the ruin of Aden, has become a place of some importance; and is generally frequented as an emporium by the trading vessels from India and the coast of Barbara.

Mukallah, situated N.N.W. of a small point of land that shelters the town on the east, is concealed from the observation of those coming from India until the vessel rounds the headland, and has almost entered the bay. Here large vessels obtain safe

anchorage close to the shore, except during the prevalence of southerly winds, to whose violence they are completely exposed. It is under the dominion of an independent Shaikh, who has power over ten or twelve other towns in this neighbourhood. The present possessor, one of a family that has for several generations been in authority at Mukallah, is named Abd-al-Rab. He is not less than seventy-five or eighty years of age; is tall in stature; is athletically made; and has a dull, sulky cast of countenance, which indicates as much sternness of purpose as ferocity of disposition. Not long previous to our arrival, one of those petty warfares, in which each party calls to their aid the Bedwins of the Desert, had been carried on between the old Shaikh and his younger brother, Abd-al-Habib. The latter, who was more popular at Mukallah than his now surviving brother, raised a considerable party in his favour, and seized on one quarter of the town, while the friends of his rival occupied another. A desultory firing was kept up between the opposite sides for several days; when Abd-al-Habib, attacked with symptoms of cholera, died suddenly; but not without the suspicion of having been carried off by poison, secretly administered. It is thus that an obnoxious individual is easiest removed; and though we have heard much of the Arabs' hospitality, their fidelity, and the openness with which they profess themselves your enemies, they will seldom hesitate to negative all these by their actions, when their interest dictates to them a contrary line of conduct. Frequent examples of poisoning happen among themselves; and, where distinguished foreigners have been the sufferers, I may mention that of the lamented traveller Dr. Seetzen, poisoned by the father of the present Imam of Sanaa, who gave to Mr. Mackell, of the Bombay medical establishment, a manuscript vocabulary belonging to the deceased, which contains the German and Arabic names of objects in natural history.

The present Shaikh of Mukallah retains in his service a considerable number of followers to protect him against domestic foes, or the attacks of the neighbouring shaikhs, who divide the possessions of this coast, and are frequently at war with each other. These armed retainers, who are generally slaves, and recruited from among the Súhailís of the African coast, are sometimes, however, less innocently employed than in humbling their foes, or keeping down sedition; and have been known to plunder defenceless boats from India, with a view of recruiting their masters' finances. Instances of this kind are less frequent than they were some years ago. The presence of our armed cruizers in this quarter, the late establishment of steam communication between India and the shores of Arabia, and the more intimate and cordial

connexion formed by the shaikhs with our eastern government, have operated as a salutary check on the lawless dispositions of the rulers who possess this coast. The Shaikh of Mukallah, however, must plead guilty of having been formerly addicted to these malpractices; and felt as little concerned, perhaps, at the death of a factious brother as he did at these acts of robbery. Abd-al-Rab, though suspected of having been accessory to his brother's death, is too far advanced in dotage to have taken an active part in the murder; and his kúraní, or secretary, who possesses the confidence and power of his master, is more justly considered to be the guilty person.

The coast of Arabia, as before said, is essentially different in appearance from that of India. Instead of the amygdaloid and basaltic rocks which, in the latter, bound the shores of the ocean, we have here perpendicular cliffs of lime and sandstone, with alternate shelving banks of white calcareous earth: for the red ferruginous soil which covers the mountain sides, and gives nourishment to grass and brushwood, we have interminable hills of bare rock, barren heaps of trap tuff, and breccia, where not a blade of vegetation is seen: for the green colour of the highlands, we have a brown or unpleasant grey appearance of the surface; and then the character and costume of the people are quite as unlike the other as is the nature of their country. The brown and sun-burnt visage, the slender but active form, and energetic manner of the Arab, clad scantily, form a no less striking difference to the fair complexion, the sleek look, and indolent movements of the Hindú merchant, clothed in ample folds of red turban and white dhotar, who is here exiled from his native land in pursuit of gain. The fine regular features of the Súmálí traders from Barbara; their ringlets of soft hair, artificially changed to a flaxen colour, and allowed to flow negligently around their shoulders, here again present a contrast to the jet black complexions and woolly hair of the Súhailís from Ajam, who have not the thick lips or protruding mouth of the negro.

The dress of the people in this district is more like that of the poorer orders of Indian Mohammedans than that of the Arabs in general. Instead of the long blue cotton shirt, with wide sleeves, which is worn by the inhabitants of Egypt and Syria, the Arabs here use a piece of striped cotton to cover their loins and thighs, and have a kirtle, made of cotton or woollen cloth, to come no lower than the groin, over which they gird a leather belt, to give support to the waist. The last also serves to retain the crooked dagger or jambia, and sometimes pistols, with one or other of which all are armed. In addition to these weapons, the Shaikh's military retainers are accoutred with swords and matchlocks.

Their usual head-dress is a scanty turban, which some twist about their heads, like a rope around a cone. Some wear sandals, though the greater number are without any covering to the feet. The Súmálís are yet more lightly clad than the Arabs; and, in addition to a wrapper for their loins, have only a thin white sheet thrown negligently around their shoulders. The people at Mukallah intermarry with the Mohammedans of Kahtewar and Gújarát; and the Shaikh's youngest wife is the daughter of a petty chief in that quarter.

The town has rather an imposing appearance on approaching it from the sea. The houses, which are generally divided into three stories, have rows of narrow latticed windows, flat roofs, and watch-towers. Railed walls, ornamented in the Mohammedan fashion, with serrated balusters, enclose the roofs of the houses, and supply the females of a family with a private place for exercise, and a cool sleeping apartment during the hot weather of April and May, which must be intolerable. The castellated appearance of the dwellings reminds one of the baronial habitations of feudal times; and this style of building was probably borrowed from the Arabs about the time of the crusades. Sunburnt bricks, of white calcareous earth, and shell limestone, are the materials generally used for buildings: which, when plastered with lime, have an air of outward cleanliness and comfort that is not found existing within them.

On visiting the Shaikh, who was seated in the second story of his mansion, we found him surrounded by a body of dirty Arab attendants, among whom were several of his children. After some conversation with the commander of the steamer, coffee, made from the husk of the plant, and sweet sherbet, were handed round. I did not relish the former, as it was without sugar; but, on giving over my cup to an attendant, the remaining contents were eagerly swallowed by him; and a clear proof afforded me that the prejudice of the Indian Mohammedans, who will neither eat nor drink with Europeans, has been adopted from the Hindús.

This Mohammedan patriarch's attendants, who laughed and prattled with each other, were so much at ease in presence of their master, as to lead the imagination back to those primitive ages when the members of a tribe shared the dangers and counsels of their lord. The room in which the Shaikh received us was nearly as primitive as the manners of his followers. It was a dirty whitewashed apartment, twenty feet wide, of which the floor was covered with a common mat: on which the old man and his counsellors were seated; and the only furniture connected with his establishment, that bore the stamp of modern days, were some chairs placed for the accommodation of his European visiters.

The hills of Mukallah, which closely approach the sea, and leave little or no intermediate beach, are composed of white limestone, traversed by sandstone, similar to what forms the hills of the Desert between Kosír and the Nile. At the base of the highest mountain, situated N. W. of the town, trap breccia occurs; and the same extends some way along the east side of a narrow valley, in which flows a small stream of good water, that has its source near the village of Bakrain, distant three miles from the port.

On the road between Bakrain and Mukallah, veins of secondary sandstone traverse the lime formation in an east and west direction. Near the village, a hot spring, of which the temperature is 98° of Fahrenheit, is met with; and also a cold one, from which the inhabitants of Mukallah, and trading boats, are supplied with water. North of the village, the road continues to pass over barren, rocky ground, and now and then to deeply wind among hills, where a few stunted bushes are the only produce, affording pasture to the goats and camels of the Bedwíns. As far as the eye can reach, there is nothing seen but a succession of hills; between which are valleys, that occur as oases in a desert, similar to that of Bakrain. The town of Hazramaut is distant, I was told, five days' journey on an ass, or about a hundred miles: on approaching which, the valleys are said to widen, and the richer and deeper soil to produce date trees abundantly. The present ruler of Hazramaut is Shaikh Bobak-bin-Salim; to whom many of the other shaikhs of this coast pay tribute.

In the valleys, similar to that of Bakrain, a small rill of water is made to irrigate a date-grove; and several patches of scanty soil, collected by building up terraces along the bed of the water-course, are cultivated with dúra, (ذُرَا)—*holcus sorghum*—some stunted radishes, and occasionally a kashew-nut tree, called vaidan (وَيدان) by the Arabs.

During the prevalence of the south-west wind, which brings rain, in June and July, to this part of the coast, a considerable stream is formed in these valleys; and the quantity of produce is thus considerably augmented, though by no means to an extent that might entitle this country to the name of Arabia Felix, given to it by the ancients. It was through the medium of this country, and the trade of the Sabæans, that the produce of India, consisting of jewels, spices, and other valuables, was conveyed to the west; and such articles of luxury seem to have influenced so powerfully the minds of those who received the imports, that imagination associated their richness and the country from which they came.

This is the only way we can account for a moderately fertile tract being distinguished by a name that ought to denote a Paradise.

During the time we lay at Mukallah, the general range of Fahrenheit's thermometer was from 78° to 83°. The wind blew from the north-east, bringing along heavy clouds, and sometimes a little drizzling rain. I was informed that this last is not unfrequent here.

The southern part of the Arabian coast, between the Curia Muria islands and Bab-al-Mandib, and also its western border, from the Straits to the neighbourhood of Mekka, was known to the Greeks, as Αραβία ἡ Ευδαίμων, or Arabia the Happy. This appellation, given to distinguish it from the other districts of Arabia Petræa and Deserta, would appear to be a translation of its Arabic name of يَمُن (Yamun), signifying "the Blest;" though some, erroneously conceiving the name to be يَمَن (Yaman), have said that the Greeks hereby meant to distinguish the country on the right or south. The geographer Ibn Alwardi describes it as that part of Arabia situated opposite the country of Barbar and Zanj, or that of the Símálís and negroes, and divided from the province of Nijd (نجد) by intervening mountains. Among the Greeks, Arabia Felix was made to include the country of the Atramitæ, or the modern Hazramaut (حَضَرَمَوت), with the possessions of the Homeritæ, the Sapphoritæ, and the Ascitæ; all of which are mentioned by Ptolemy and Pliny. The Arabian geographers, in like manner, sometimes include Hazramaut and Tahamah* in Yaman; though they generally restrict the appellation to that part which, embracing the sea-shore and mountainous tracts about Marib and Sanaa, extends from about Mokha to Ras Harjiah, or the ancient emporium Arabiæ. East of this is Hazramaut; of which the district, on the coast, from Ras Harjiah to Zafar, near Ras Morbat, is known by the name of Shíhír†, erroneously called Seger or Sijar, from a wrong reading of its Arabic name. It is mentioned by Marco Polo, with the article, and correctly called *Escier;* the chief city of which gave name to the whole, and was forty miles east of Aden.

* Tahamah is thus described by Ibn Alwardi:—"It is a division of Yamun, situated between Hijaz and Yamun, and is environed by mountains. Its limits are the Sea of Kolzum on the south and west, and the mountains on the north and east. It is inhabited by Arab tribes; and among its cities Hejar is celebrated."

† According to the Arabic geographical dictionary, called Maajmu-l-Baldan, Al-Shíhír (الشِّحر) is a tract of country on the coast of the Indian Ocean and the territory of Yamún, extending, they say, from Aden to Oman, to which it is joined.

In this district is situated the town of ظفار (Zafár or Dafar), which must not be confounded with a city of the same name in the neighbourhood of Sanaa. The last, according to the geographical work called "Maajmu-l-Baldan," is now in ruins, and was the capital of the sons of Hamáiar, or the Homeritæ, a branch of the Sabæans; over whom Charibael was sovereign in the time of the Periplus*. The Homeritæ inhabiting Zafar were known to the ancient geographers as the Sapphoritæ, who inhabited the country between the Homeritæ and Sabæans. Pliny tells us that Saphar was a town that lay inwards from the port of Ocelis, and that the kingdom was called Saphar or Savé. He has confounded it, as would appear, with the district of Saba or Marib †; for Savé is placed, by the Periplus, as a town distant three days from Moosa, and thirteen from Aphar, or Zafar, in the country of Sanaa. The Savé here meant is probably the same as شعبة (Sháibba) of the Maajmu-l-Baldan, which is said to be opposite Yamún, and on the road from Zabíd (زبيد) to (صنعا) Sanaa. Saba (سبا), called by Ezekiel Sheba‡, and described by Ibn Alwardi to be the same with Marib, must not be confounded with Savé and Sabbatha; the last of which is a city in Hazramaut, now called Shibam (شبام). Marib, or Saba, was the chief place from which oriental produce was obtained in the early ages, and is north-east from Sanaa. From this the merchants came to occupy the fairs of Tyre "with the chief of all spices, and with all precious stones and gold‡."

Amidst many different opinions entertained regarding the country from whence came that celebrated queen who visited Solomon at Jerusalem, none appears more reasonable than that which assigns its locality to Marib. From this she came with "a very great train, with camels that bare spices, and very much gold, and precious stones§." Spices were used for the anointing the tabernacle of the congregation, the ark of the testimony, the altar of incense, and of burnt offering||. The cassia, cinnamon, and

* Vincent's Periplus of Arrian, p. 314.

† The Nubian geography says, that Marib is also one of the cities of Hárzamaút, but which is now in a manner destroyed; and this is the city of Saba, from which came Belkis, the wife of Solomon. From Házramaút to Saba is a distance of two hundred and forty miles; and between this and Sanaa there are one hundred and twenty miles.

‡ Ezekiel xxvii. 22. § 1 Kings x. 2. || Exodus xxx. 23.

sweet calamus were imported from India, but the myrrh was brought from Barbara and the African coast, as was the gold presented by the Queen of Sheba to Solomon.

The present articles of trade bartered in this quarter are the same as when the Roman merchants frequented these shores. I was told, at Mukallah, that besides the myrrh, gum, and frankincense, brought by the Súmális from Barbara and Ajam, sheep, fowls, eggs, and slaves are imported, and find a ready sale in Arabia.

There are two kinds of frankincense or (لبان) loban; one of which is the produce of Hazramaut, and is collected by the Bedwin Arabs; the other is brought by the Súmális from Africa. The former, which is met with in small globular lumps, has a tinge of green in its colour; but the other, which is more like common resin, is of a light yellow appearance. What the Súmális import, and name لبان معطي (loban mati), is less fragrant than the Arabian kind; it is, therefore, preferred for chewing, but the last is more used for fumigation. Both kinds are exported by the Hindú merchants to India, along with myrrh, gum, and small portions of honey, collected in the country near Aden. The sheep, which are of the Abyssinian breed, have large tails, like those of the Cape of Good Hope, and are covered with fine white hair instead of wool; these, with the fowls and eggs, are sold to trading vessels that touch on the coast. On our arrival at Mukallah, there were two American vessels at anchor. They had come here to obtain a stock of fresh provisions and radishes, as one of them had a crew suffering from scurvy; which disease made its appearance during a long cruize in search of spermaceti whales. Excepting sharks' fins and salt fish, obtained here in great abundance, the articles before mentioned are the only ones imported from this part of Arabia: and in return, the merchants trading to India buy rice, sugar, and cotton clothes; as in the days of the Periplus, when the inhabitants of Muza sailed to Lymirica, and Barygaza, or the Desert of Sind, and Broach, and brought these articles back to Dioscoris, or Socotra. In exchange for these, they loaded their boats with tortoiseshell. Besides the last, ivory was purchased on the coast of Barbara; and at the present day it is brought here by a caravan from the interior of Africa.

The town of Barbara* is situated nearly two hundred miles to

* Ibn-Alwardi says, "The country of Barbara is joined to the country of Núbah, on the sea-coast opposite Yaman; and in this there are populous towns, and a mountain which they name Kanuti. This mountain has seven peaks, and is visible for forty-four miles at sea. Many of the people of Barbara eat frogs, reptiles, and other unclean things."

the south of Bab-al-Mandib. A fair assembles here annually, when small trading vessels arrive from the Red Sea and Persian Gulf. Caravans, of four thousand camels, come at this time from the interior of Africa, and bring with them gums, ivory, ostrich feathers, skins, and other articles. The language of the Súmálís, who possess this country, is the Ghíz or Ethiopic; which, from the specimens of it given in Ludolf's Lexicon, is a language cognate with Arabic. The geography and trade of these countries, hitherto so little known, deserve to be more fully investigated: but I now resume my journal of the steamer's progress along the Arabian shore.

On the 24th of January we left Mukallah, and passed Cape Aden. The following morning, at daylight, we came in sight of Ras Bab-al-Mandib, which is a moderately elevated conical hill of apparently basaltic formation. The Straits, or Bab-al-Mandib, are two narrow entrances to the Arabian Gulf, separated by the island of Perim; which is a black rock, on which there is no trace of vegetation. The eastern, or smaller strait, is about three miles in breadth, the other fifteen. We sailed through the former with a light south-east breeze; and, before night, passed Mokha and Jabal Zeghir. South of Jabal Zí, called by the Arabs, Daoab, and near the entrance of the eastern strait, there is a sandy bay, with a Bedwin village and water; the situation of which corresponds with that of Ocelis, said by Pliny to have been more a watering-place than an emporium. Near the island of Perim, and on the African shore, numerous turtles, that are poisonous when eaten, are caught, on account of the tortoiseshell. Many Arabs find employment in this trade, as in the age of the Periplus.

Having passed Mokha, we continued our voyage, and experienced, on the 27th, an unusually sultry and oppressive state of the weather, which was accompanied by a breeze from the E.S.E. These phenomena, being very uncommon at this season of the year, led the captain to conclude that they would be soon succeeded by a strong N.W. wind. Accordingly, towards night, the breeze set in from this quarter, and continued increasing, accompanied by cloudy weather and rain. Before the succeeding morning, the breeze had become so powerful, and the sailing-rate of the steamer so much diminished, as to render it doubtful whether, with the limited quantity of coals then on board, the passage to Jidda could be made good. At noon, the island of Zobair was seen bearing N.W. by W.; and, there being now an object in seeking a place of shelter till the wind moderated, we bore up for Hodida, and not long after came to anchor in four fathoms water.

Hodida is a town of considerable size, situated N.E. of a sandy bay, which, on one side, is sheltered by the land running out N.W., and the other S.S.E. Ships, when anchored here,

are well protected against a heavy swell, if coming from the north, as a coral reef on that side breaks the violence of the surf. The style of building is similar to that of Mukallah, but the houses are on the whole better finished; and the domes and minars of several mosques are advantageous additions to the beauty of the town. Though ships and boats less frequently resort to this harbour than the one at Mukallah, yet the market-place of Hodida is better supplied with articles of comfort and luxury. Besides silks and cloths of various kinds in the bazaar, I observed that the several grains procurable in India were exposed for sale. Jauar, called by the Arabs ذرا (dúrah), bajrí or (دخن) dúkhan, korad, or dújrah hindí (*phaseolus maximus*), chúna, or (سنبرا) sambarah (*cicer arietinum*), with wheat and barley, called بر (barr), and شعير (shair), are produced, and brought from the valleys of Yamún, where small streams irrigate the only fertile portion of Arabia. In the neighbourhood of Mokha, and about Hodida, the country is flat and sandy, and chiefly produces date-trees; but from the mountains beyond the Tehamah, which are visible from the coast, and are distant two days' journey, grapes, coffee, limes, and other produce are brought to the market.

About seventy miles south of Hodida there is a river, on the fertile Wadi of Zabíd, which is the only stream of Arabia that contains a sufficient quantity of water to enable the current to reach the ocean. It has been sometimes doubted whether any of the Arabian streams reached the sea; and many have thought the water of all was expended in irrigation, or lost in the sands. I have been informed, however, by good authority, that this stream forms an exception to a general rule. When Ibn-al-Wardi wrote his geographical dictionary, called "the Pearl of Wonders," Zabíd is described as a large city on a small river, where merchants from the maritime parts, from Habshah, or Abyssinia, Irak, and Egypt, came to trade. It has since declined in importance, and the mouth of the river in which it lies is now so much obstructed by a bar of sand, that its water continues quite sweet to the very place where it disembogues itself into the sea.

On our arrival at Hodida, the town was in possession of the rebellious Turkish soldiers of Mohammed Ali, who had mutinied the previous year, and taken possession of the town and mosque of Mekka, but were soon after driven out by the Nizam Jadíd. Tûrchí-bil-Maas, their leader, who was absent at Mokha, had also seized on Zabíd, Bait-al-Fakíh, and other places along the coast.

The only cruelty he committed in these conquests was having put to death in cold blood the Daúla of Mokha. The country seized on has been long subject to the Imam of Sanaa; who, sunk in effeminacy and debauchery, thinks not of his subjects' happiness, while he can tyrannically find the means of gratifying his sensual propensities with the money contributions of his deputies, unjustly raised by exaction. Since our visit the rebels and Tûrchí-bil-Maas have been driven out of Mokha by Ali-bin-Majitta on the part of the Imam.

We sailed from Hodida on the 30th of January, and arrived at Jidda on the 2nd of February. Any description of this place is here unnecessary, after the excellent account given by Burckhardt, the best and most learned of Eastern travellers. Between Jidda and Ras Mohammed, there are several places known to ancient and modern geography, that can with certainty be identified; but Dr. Vincent has already so well illustrated this subject, that little remains for others to do. I may, however, remark that the ruined town of Inouanah, near the Gulf of Akaba, is the Onné of the Periplus, and that Charmotas is the Sharm Yambú; for Sharm signifies, in Arabic, a port.

From Jidda we sailed for Kosír, where we arrived on the 10th of February, from which date I will continue my original journal, containing an account of the road from hence to the Nile.

Feb. 11*th.*—I visited old Kosír, six miles N. W. of the modern town. The town of old Kosír is situated on the north side of an inlet of the sea, which formerly extended westward into the land about a mile, but is now crossed by a bar of sand, that prevents the ingress of the water into the former channel. The ruins of the houses are chiefly found on the north side of the channel, which is still swampy in some parts of the bottom, where, in former times, the sea formed a kind of backwater to the point of land on which the town stood. North of the town a range of calc-tuff mountains extend a little to the east, and shelter the site of the town from northerly winds. Two small conical risings crown the summit of this range, and are the chalky mountains mentioned by Bruce. The banks which bounded the former inlet, are formed of white calcareous tuffa and sand, as is also the whole of the shore of the Red Sea at this part The sea appears to have gradually retired from the land, and left a considerable beach between its present limits and the base of the mountains westward. Mr. Carlass, of the Indian navy, found a portion of an alabaster vase among the ruins, and numerous portions of broken glass, and lackered pottery are found. Thermometer at day-break, 61°.

New Kosír is situated on the south side of a sandy point of land, the base of which is formed of shell limestone, forming a

kind of cove or anchorage where vessels may lie in five fathoms of water within sixty yards of the shore. South of the town, at the distance of twenty miles, a range of hills, 4000 feet in height, is visible. The sandy banks south of them are more abrupt than those in the north, over which run hills of calc-tuff, that ascend to the height of 200 feet. Between the sand banks and the sea, there is a flat gravelly beach, varying in breadth from a quarter to three-quarters of a mile. The houses of the town are low and meanly built of sun-burnt bricks, made of white calcareous earth, and only a few of them consist of two stories. North-west of the town is a small citadel defended by round towers, and a few guns of no great calibre are mounted on the works.

Feb. 12th.—Marched from Kosír, going W. N. W. for one hour and twenty-five minutes between banks of breccia and pebbles, which appeared stratified as on the banks of rivers. A few minutes after came to a stream of water, which followed the course of the road, that then turned west and continued so, as far as the Bír Anglís. These are wells of brackish water, dug by a detachment of the Indian army which went by this route into Egypt, and are distant two hours and thirty minutes. On the south side of the stream, some black hills of trap-rock occur, and soon after, on the same side, there are ranges of stratified limestone, of which the strata dip N. E. On the opposite side, sandstone and lime are found alternately. The whole of the road is flat and gravelly, having all the appearance of a broad dry river bed, opening here and there, on the right and left, into valleys of two or three miles in length. In the limestone, near Bír Anglís, the strata alternate with sand, and are frequently studded with round pebbles. Thermometer at day-break 61°, in the shade, marching, 70°.

While near the shores of the Red Sea, I may mention that Lieutenant Wellstead, of the Indian navy, found three stone tablets belonging to a temple which he uncovered near Ras-ul-Anf, and has determined beyond doubt the site of the antient Berenice. Two of the tablets were inscribed with hieroglyphics, and a third with Greek. The last, which was mutilated, contained a dedicatory inscription by a Ptolemy, who had for his queen a Cleopatra, his wife and sister. Such was the case with Ptolemy Euergetes, P. Lathurus, and P. Dionysius, husband of the renowned Cleopatra.

Feb. 13th.—At thirty-five minutes past seven, left Bír Anglís in continuation of the march through the Desert. The two narrow wells of brackish water at Bír Anglís are the only means of supply which the poor Moghrobin pilgrims, going by this route to Mekka, have of quenching their thirst, though the water is totally

unsuited for the use of those who can carry with them skins of wholesome water or other such means of supply. The road lay west for one hour and twenty minutes, or four miles, between light-coloured hills of lime and sandstone, situated on the right. The flat tabular arrangement, scarped-like face, and striated appearance of the different strata of these hills were finely contrasted with the black shining surface, the rounded waving ridges, and conical projections of the trap breccia on the left. The valley, which had seldom exceeded in breadth a good-sized river, narrowed where the sandstone formation joined the other, which was continued on both sides of the road, though rocks of the sandstone formation occasionally re-appeared. After thirty-five minutes past eleven, we arrived at Sayad Súliman, where are the remains of an old wakalah or caravanserai, and a well of tolerably good water for the desert. The latter, as appears from the names of Messrs. Briggs, Hancock, and Wood being recorded here, had been lately repaired at their expense. The distance between Bír Anglís and Sayad Súliman took us four hours; and, after having rested a little, we continued our march, four hours more, to Abú Zíran, where there is no water. Here there is a ruined wakalah, in the middle of which there is a deep excavation, now partly filled up, but which was either a reservoir for water, or a well. We passed several watch-towers on the road, and another ruined wakalah, besides those just mentioned; all of which are said, by the natives, to be the work of the Afranj, but who may be particularly meant by the term does not appear clear. The distance from Sayad Suliman took four hours, the road occasionally turning S. and S.W. The loaded camels were ten hours from Bír Anglís to Abú-Zíran.

Feb. 14*th.*—Left Abú Zíran at half-past seven: the thermometer, at sun-rise, was as low as 35°. For an hour and ten minutes, the road lay W., after which it ascended a little, running W. S. W. one hour and fifty minutes more to Bír-us-Sid, where there is water. On the rocks, south of this well, there is a short hieroglyphic inscription. From Bir-us-Sid, two hours and twenty minutes, we came to a well-executed hieroglyphic inscription, on the north of the road; a little farther on from which, and on the opposite side, very distinct and extensive hieroglyphic inscriptions are found. From hence to Hammamat is a distance of thirty-five minutes. Here there is a ruined wakalah, and a very deep well of bitter water, to which we descend by stone steps. The whole fabric has been lately repaired, and a Marhab or altar-piece built, for the Ababdí Arabs of the desert, by the gentlemen whose names are recorded at Sayad Suliman. At Hammamat, the hills, formed of black trap-rock or wacke, are of greater

altitude, and more abrupt than the ranges previously met with; and about an hour and a half, or four miles and a half from hence, the beds of the watercourses, which ran east in the previous part of the road, now began to end. West from Hammamat to Jaif-ul-Ajúl, where we halted, was a distance of one hour and fifty minutes. The loaded camels performed the whole distance from Abú Zíran, in nine hours and forty-five minutes. Jaif-ul-Ajúl is a sandstone rock, on the right-hand side, where the camelmen usually halt; it is covered with hieroglyphic characters, and over a small model of a portico to a temple, on each side of which is a figure of Osiris, there is something written in demotic characters.

Feb. 15*th.*—Left Jaif-ul-Ajúl at a quarter past seven. The thermometer at sunrise was 38°. The route alternately lay W. N. W. 80°, and W. S. W. 80°. Soon after leaving this place, the country expands and becomes more open, the road running between low ridges of sandstone, while the high hills appear at a considerable distance on the right and left. Arrived at Lagetta after five hours and a half. The loaded camels were seven hours and fifteen minutes on the road. Lagetta in an Ababdí village.

Feb. 16*th.*—Left Lagetta at seven o'clock. Thermometer 39° at sunrise. Arrived at Bír-Amber after six hours, the loaded camels having taken seven hours and a half. The route lay alternately W. N. W. and N. N. W. over successive ridges of sandy gravel. Amber is the first village on the limits of cultivation; having on the east side high banks of gravel and sand, and about six or seven miles from it are the sandstone hills which bound the Nile on the west. The hills from this village bear W. S. W. 80°, and run towards the north. On our arrival at the mosque of this village, built by Ibrahim Pasha, the villagers brought out milk, butter, eggs, and fowls ready cooked, and entreated us to buy their articles. The scene was altogether a novel one, and so ardently did the venders urge their claims to our patronage, that we were at length induced to buy something, in order to get rid of their troublesome entreaties. We found the double water-wheel of India here worked by bullocks. The Shaikh of the village induced us to take a night-guard, by telling us what former travellers had suffered from the thieves.

Feb. 17*th.*—Left Bír-Amber at half past seven, and arrived at Keneh at eleven, having been three hours and a half. Thermometer 52° at sunrise.

In concluding these cursory observations on the countries and inhabitants in the vicinity of the Red Sea, I would suggest the propriety of this Society endeavouring to obtain, through the means of some of its travelling members, a more full and accurate de-

scription than we yet possess of that part of Arabia called the coast of Hazramaut; and also an account of the countries of Ajam and Barbara, which, from their connexion, prior to our era, with the Greek kingdom of Egypt, are well worthy the attention of geographers. The history of the different races inhabiting this quarter would be a subject of curious inquiry; and an account of the physical characters of the Súmalí and Bedja tribes, and in what respects they are different from those of the Shangalla and Negros, would enable us to determine, with accuracy, the origin and distribution of these several orders of men.

ANALYSES,

&c.

I.—*Private Journal kept on board H.M.S. Favorite on the Newfoundland Station.* By Captain H. Robinson, R.N. 1820. MS. pp. 39, with App.

So little is generally known of Newfoundland beyond the immediate precincts of St. John's, that we have examined this Journal, placed in our hands by the politeness of the author, with some care, in hopes of gleaning a few novel facts from it. Unfortunately, however, it is of fourteen years' date; and that which at the moment would have been valuable has been for the most part anticipated, particularly in the account of Newfoundland published in Macgregor's British America. Our selections must therefore necessarily be few, and of inferior interest. They must also be desultory, to avoid quoting from the account adverted to. It is known that the Newfoundland Station includes the coast of Labrador; and regarding this latter, Captain Robinson observes:—

'The climate is here bad: dig deep, and frost is found throughout the year. The harbours are good, but the bottom is every where rocky. Ships (men of war) coming on the coast should have two chain-cables; and make a garden at L'Anse à Loup on their first arrival. The soil here is rich, and it is much the most eligible part of Labrador for settlers. Corn will not ripen, but serves for green food; and potatoes, cabbages, lettuce, spinach, and early Dutch turnips do well. Fish are abundant, but there is no weather to cure them after the 10th September. Herrings are very fine, and plentiful in August. Curlews came on the 15th August, and went on the 15th September; succeeded by grouse, ptarmigan, and partridges. There is generally much rain on the whole coast; but the temperature was more equable,

according to our observations, than when Cartwright made his in 1778-9. The current always sets to the southward along the coast: the tides rise six feet to the northward; about four to the southward. The prevailing winds are from W.S.W. to N.W.; there is less fog than farther south, and the Straits of Belleisle are never frozen over.

"The prevailing rock on the Labrador coast is gneiss. On this at L'Anse à Loup, a bed of old red sandstone is superposed, about two hundred feet thick, and extending above half a mile inland. Here also, as on every other part of the coast of Labrador visited by the Favorite, the appearance of the cliffs, and of the land near them, and the rolled masses inland which have evidently been exposed to the action of the sea, seem to prove that this has considerably receded. The sandstone is generally red and white, in alternate stripes, and presents a remarkable mural front to the sea. Near the surface it was strongly marked with iron. The whole of the rock was composed of white quartz and yellow felspar; and the grains were generally as fine as oatmeal, though occasionally coarser, even to the extent of half an inch in diameter. Both coarse and fine bear marks of being a mechanical deposit, being perfectly distinct, without the least appearance of amalgamation, only a few exceptions occurring to this remark.

"Over the red sandstone was a thin stratum of red compact felspar, containing vegetable impressions, and also horizontal. Above this were varieties of secondary limestone, arranged in parallel strata several feet thick, and full of shells. Detached masses of primitive limestone were also found; and a few miles from the shore the secondary formations generally disappeared, leaving gneiss and mica slate on the surface.

"North of Cape Charles on the Labrador coast the land falls back to the westward, and the shore changes its character, becoming shoal and running off in flats; whereas to the southward it is bold and abrupt. The prevailing rock, however, is still gneiss, containing numerous veins of granite, from a few inches to many feet in thickness, the constituent parts being highly crystallized plates of grey mica four or five inches in diameter, very transparent quartz, and finely-reticulated white felspar. The diameter and dip of the gneiss rock is here, as elsewhere on the coast, to the north-west, and at an angle of nearly 65°. It is coarse and dark, hornblende taking the place of mica; and frequently very light greyish felspar forming the chief constituent. Where this occurs, the face of the hill has a remarkable spotted appearance. On one of the islands which here skirt the coast, a large bed of pri-

mitive greenstone was found, forming a range of hills resting on the gneiss, and appearing to have the same direction. On the western part of these islands also the gneiss gives place to mica slate, this commencing beyond the above-mentioned range of greenstone, which appears to mark the line of demarcation between them. The mica slate then predominates through all the islands and shores examined to the westward of this point:—viz., to the Mealy Mountains in Sandwich Bay, a distance of about thirty-five miles. In some places crystals of garnet are very abundant in it; and in others considerable beds of granite were found, of confused appearance, and in which quartz and felspar predominated. The Mealy Mountains are the highest land on this coast, and were computed to be about 1484 feet high, covered nearly to the top with wood, notwithstanding the severity of the climate. They are of mica slate, with a dark, fine-grained formation of the same, resembling basalt, at their base. The general rock is coarse-grained. At the foot of these mountains were also found beds eight and ten feet thick, and large rolled masses, of a remarkable conglomerate rock, of which the basis was composed of grains of mica, quartz, and felspar; and the imbedded masses were large rounded pebbles of quartz, mica slate, felspar, horneblende, granite, and gneiss. The whole was so hard as to be with difficulty broken, striking fire under the hammer. The imbedded fragments were all water-worn.'

The following is the Meteorological Table kept on board the Favorite, chiefly off the Labrador coast, from the 18th June to the 6th September, 1820:—

Abstract of a Journal of the state of the Weather, &c. on the Coast of Labrador, from June 18th to Sept. 6th, 1820.

Date.		Barom.	Therm.	Lat. ° ′ ″	Long. ° ′ ″	Winds.	Remarks.
Sunday,	June 18	30 5 0	56	..	..	Southerly	Sailed from St. John's.
Monday,	„ 19	30 2 7	48	50 0 0	52 9 30	Variable	Rainy weather.
Tuesday,	„ 20	30 4 3	41	..	..	N.W.	Fine weather.
Wednesd.	„ 21	30 3 5	42	..	..	East	Foggy.
Thursday,	„ 22	30 4 0	42	..	..	S.E.	Hazy. Arrived in Niger Sound.
Friday,	„ 23	30 1 8	42	..	..	E.N.E.	Foggy.
Saturday,	„ 24	..	43	..	..	East	Fine weather.
Sunday,	„ 25	..	45	..	..	South	Ditto.
Monday,	„ 26	..	44	..	..	S.S.W.	Rain.
Tuesday,	„ 27	30 0 0	44	..	..	Southerly	Heavy rain. [Cape Charles.
Wednesd.	„ 28	30 1 8	53	..	..	..	Fine weather. Went round to
Thursday,	„ 29	30 3 2	46	..	..	S.W.	Fresh breezes. [the Seal Islands.
Friday,	„ 30	30 2 3	50	..	..	..	Left Cape Charles, & anchored at
Saturday,	July 1	29 9 2	46	..	..	..	Left Seal Islands, and anchored
Sunday,	„ 2	30 2 9	55	53 27 0	55 16 15	Variable	Fine weather. [in Sandy Bay.

Date.		Barom.	Therm.	Lat.	Long.	Winds.	Remarks.
				° ′ ″	° ′ ″		
Monday,	July 3	30 3 0	58	..	..	Northerly	Cloudy weather. Left Sandy Bay.
Tuesday,	„ 4	30 2 4	45	..	..	S.W.	Rainy. Anchored at Black Island.
Wednesd.	„ 5	30 2 6	47	..	..	N.E.	Fresh Breezes.
Thursday,	„ 6	30 5 6	52	..	..	..	Cloudy weather. Anchored in
Friday,	„ 7	..	57	..	..	Variable	Fine weather. [Cartwright Bay.
Saturday,	„ 8	30 0 5	77	..	..	Ditto	Ditto.
Sunday,	„ 9	29 9 0	59	..	..	..	Anchored off the Mealy Moun-
Monday,	„ 10	30 2 2	58	53 46 0	57 1 15	Northerly	Fine weather. [tains.
Tuesday,	„ 11	30 3 4	62	..	..	..	Anchored below the Mealy Moun-
Wednesd.	„ 12	29 9 7	58	..	..	Calm	Rainy weather. [tains.
Thursday,	„ 13	30 3 2	52	..	..	Variable	Fine weather.
Friday,	„ 14	..	72	..	..	..	Mealy Mountains 1482 feet high.
Saturday,	„ 15	30 1 2	57	..	..	Variable	Rainy. [dian Harbour.
Sunday,	„ 16	30 2 0	62	..	..	..	Fine weather. Anchored in In-
Monday,	„ 17	30 4 3	69	..	..	..	Anchored in Dumpling Harbour.
Tuesday,	„ 18	30 0 2	73	..	..	Westerly	Moderate and cloudy.
Wednesd.	„ 19	..	[illegible]	..	..	Calm	Fine weather.
Thursday,	„ 20	30 5 1	[illegible]	..	..	S.E.	Fresh breezes. Anchored in
Friday,	„ 21	..	49	..	..	Ditto	Foggy weather. [Gready Harb.
Saturday,	„ 22	30 4 7	48	..	..	.	Fine ditto. Sailed from Gready
Sunday,	„ 23	30 6 4	49	..	..	S.E.	Foggy. [Harbour.
Monday,	„ 24	30 2 2	52	..	..	..	Hazy. Arrived at Cape Charles.
Tuesday,	„ 25	30 0 8	61	..	..	Variable	Rainy.
Wednesd.	„ 26	30 0 0	72	..	..	Ditto	Fine weather. [miral.
Thursday,	„ 27	30 0 0	73	..	..	..	Grasshopper arrived, with the Ad-
Friday,	„ 28	30 0 2	56		..	..	Foggy. Sailed from Cape Charles.
Saturday,	„ 29	30 3 0	51	..	..	..	Hazy. Arrived at Croque.
Sunday,	„ 30	30 3 3	57	..	..	Variable	Rainy.
Monday,	„ 31	30 2 5	72	.	..	Calm	Fine weather.
Tuesday,	Aug. 1	30 2 5	72	..	..	Variable	Rainy.
Wednesd.	„ 2	30 2 5	62	..	.	Ditto	Cloudy.
Thursday,	„ 3	29 7 9	57	..	..	Ditto	Rainy.
Friday,	„ 4	30 1 2	56	..	..	N.E.	Fine weather. Sailed from Croque.
Saturday,	„ 5	30 1 3	70	..	..	Easterly	Ditto.
Sunday,	„ 6	30 0 2	58	..	..	..	Squall. Arrived at L'Anse
Monday,	„ 7	30 3 0	64	..	..	S.W.	Fine weather. [à Loup.
Tuesday,	„ 8	30 2 0	62	..	..	W.S.W.	Ditto.
Wednesd.	„ 9	30 0 0	65	..	..	Ditto	Fresh breezes.
Thursday,	„ 10	29 6 0	60	..	..	Variable	Rainy weather.
Friday,	„ 11	29 8 3	61	..	..	Westerly	Fresh breezes.
Saturday,	„ 12	30 1 6	60	..	..	Variable	Rainy weather.
Sunday,	„ 13	30 0 5	60	..	..	Ditto	Cloudy.
Monday,	„ 14	30 4 0	58	..	..	Ditto	Ditto.
Tuesday,	„ 15	30 6 0	55	..	..	..	Fine weather. Sailed from L'Anse
Wednesd.	„ 16	30 6 1	58	..	..	Variable	Ditto. [à Loup.
Thursday,	„ 17	30 5 4	58	..	..	..	Ditto. Arrived in Francis Harb.
Friday,	„ 18	30 3 0	67	..	..	Westerly	Fresh breezes.
Saturday,	„ 19	30 3 2	61	..	..	Ditto	Foggy weather.
Sunday,	„ 20	30 3 4	58	..	..	N.E.	Rainy ditto.
Monday,	„ 21	..	..	..	..	Variable	Fine ditto. [Harbour.
Tuesday,	„ 22	30 0 7	60	..	..	..	Strong gales. Sailed from Francis
Wednesd.	„ 23	30 4 2	58	..	..	..	Fresh breezes. Arrived at L'Anse
Thursday,	„ 24	..	..				[à Loup.
Friday,	„ 25	29 9 9	60				
Saturday,	„ 26	30 5 2	61				
Sunday,	„ 27	30 5 5	64				
Monday,	„ 28	30 3 0	63	..	..	..	Rainy weather.
Tuesday,	„ 29	30 3 0	60	..	..	S.W.	Fine ditto.
Wednesd.	„ 30	30 3 0	62				
Thursday,	„ 31	30 5 6	57				
Friday,	Sept. 1	30 5 0	60				
Saturday,	„ 2	29 8 7	58	..	..	..	Heavy rain.
Sunday,	„ 3	30 3 2	56				
Monday,	„ 4	30 4 0	60				
Tuesday,	„ 5	30 5 0	59				
Wednesd.	„ 6	30 0 3	60	..	..	Northerly	Fresh Breezes.

The following also is an abstract of the information respecting the Labrador fisheries the same year :—

" The American fishermen sail from all the northern ports of the Union. As nearly as could be computed, there were 530 sail of them this year, generally schooners, but some few brigs and sloops and manned with crews of from nine to thirteen men. Eleven would be a full average, giving 5830 as the number of men employed. One hundred quintals of fish per man is a full average of their catch ; with oil in the proportion of one ton to every two hundred quintals. The Americans clean their fish on board, and thus leave the coast early. They use much salt, and their fish is considered inferior to our best. They are expert and industrious fishermen, generally preferring the northern part of the coast, but following the fish wherever they are to be found. They receive a bounty from their government in the shape of a drawback on the salt used ; and they fish in shares, a merchant in America furnishing the vessel, and one-third of the boats, nets, lines, and salt ; the crew furnishing their own provisions (which are of a very frugal description), and the remaining two-thirds of the boats, nets, lines, and salt. They divide in the same proportions, and the system is said to answer well.

" The French are much less successful fishermen, and do not very much frequent the Labrador shore, though they have some permanent stations on it. It is not believed, however, that they could maintain them, were it not for their extreme frugality, and the premium allowed by their government, which is so regulated as to make 20 francs per quintal the minimum price received by the fishermen.

" In 1820, the English fishery on the Labrador coast north of Cape Charles was as follows :—

Report of the Fisheries carried on on the Coast of Labrador, &c., in the Year 1820.

Place.	Nature of the Fishery.	Employed therein.					Produce this Year.								To what Country exported	Remarks.
		Vessels.			Boats.											
		Number.	Burden in Tons.	Men.	Number.	Men.	Number of Whales.	Number of Seals.	Tons of Seal Oil.	Number of Sea Cows.	Tierces of Salmon.	Quintals of Cod.	Tons of Train Oil.	Furs.		
From Cape Charles northward, to Sandwich Bay.	Salmon, Seal, and Cod.	49	4169	979	152	326	1	3100	66	..	417	134,580	674	602	England, Lisbon, and different parts of the Mediterranean.	In all harbours where there are any considerable fisheries, a few people winter, to take care of the property, cut wood, and catch furs. These constitute the only resident population.

Petty Harbour, Fishing-Ship Harbour, Occasional Harbour, Square Island Harbour, Cape Bluff Island Harbour, Snug Harbour, St. Michael's Bay, Double Island Harbour, Partridge Bay, Black Bear Bay, Island of Ponds, Spotted Island Harbour, and Table Harbour: at all these places there are small establishments, principally of adventurers from Newfoundland; and, by the best information which could be obtained respecting them, they may be estimated to yield about 1500 quintals for each post, on an average, making about 20,000; with a proportion of oil, at the rate of one ton for every two hundred quintals of fish, making one hundred tons. At all the smaller intermediate harbours, there is an appearance of settling and building houses, but we cannot estimate their produce at all correctly; though, from the number of new settlers along the coast, besides the number of Newfoundland and Nova Scotia vessels which carry on a desultory fishing and take away their cargoes, a very considerable quantity of fish may be added to the above estimate, perhaps 20,000 quintals.

On the 8th September, the Favorite quitted the coast of Labrador, and made for Conception Bay, Newfoundland. On the passage Captain Robinson observes:—

"Passed several icebergs, which are diminished in size since we last saw them. A matter-of-fact person has great difficulty in entering into that excited state of imagination which invests these icebergs with wild magnificent forms and resplendent variegation of colour. To me they show nothing arabesque, but appear large mis-shapen hills of dead white, frequently of a light green or blue tinge, with fissures of a darker shade. The laugh directed against Captain Ross for describing the Arctic Highlanders as astonished at a looking-glass, when they must have seen themselves in icebergs, appears to me without reason, as these mountains of frozen snow are perfectly opaque, their edges alone, or thin portions, being slightly translucent; and the rough surface is nearly as incapable of performing the part of a looking-glass, as would be a white-washed wall."

On the 10th September, the Favorite arrived off Harbour Grace, in Conception Bay, after sailing along "a nice English-looking coast, studded with many fishing establishments. Harbour Grace is a good port; and the town is considerable, and of a respectable appearance. Conception Bay, in which it is situate, is the richest and most populous country district in Newfoundland, containing altogether 14,600 inhabitants, a large proportion of the 86,000 which the most recent census (1820) gave for the whole population of the island. They are distributed in a number of small towns, or fishing and agricultural hamlets; near another of which, Port Grace, a remarkable basin is hollowed out in the cliffs by the action of frost, or the more certain operation of time in decaying the slate clay of which the rocks are composed. First an arch is entered, 20 feet wide by 20 high; and beyond is the basin itself, which is about 300 feet in circumference, and surrounded by perpendicular rocks 120 feet in height, with a border of dwarf spruce at top. At one corner a little exit among broken masses of rock carries off the superfluous water; the depth near the centre of the cavity is about 14 feet."

Not far from this, and near the extremity of Port Grace Harbour, are also the remains of a supposed ancient colony, which some have attributed to the Danes or Icelanders; but which, Captain Robinson comes to the conclusion, cannot be earlier than the first settlement of the country by the English under Lord Baltimore. The opposite opinion he conceives to be founded on a statement quoted (he believes, on private authority) by Mr. Barrow, "that a party of settlers, proceeding up a river which falls into Conception Bay, observed at the distance of six or seven

miles above the Bay, the appearance of stone walls rising just above the surface. On removing the sand and alluvial earth, they ascertained these to be the remains of ancient buildings, with oak beams, and mill-stones sunk in oaken beds. Inclosures resembling gardens were also traced out, and plants of various kinds were found growing about the place, not indigenous to the island; but the most decisive proof of these ruins being the remains of an ancient European colony was drawn from the different kinds of coins found about them, some of Dutch gold, which the inhabitants considered to be old Flemish coins, others of copper without inscriptions.' In opposition to this, however, the following facts and arguments are adduced by Captain Robinson:—1. The actual magnitude and extent of the remains of buildings found are greatly over-stated in the above extract. He examined them very carefully, and could find nothing of more importance than the remains of a mill. 2. The supposed remains of gardens are five miles from this spot, and twelve miles from where the coins were found; the existence of which last in the place where discovered, may, he thinks, be satisfactorily accounted for by the habit, indulged in by all the ancient voyagers, of burying coins. Only four, as far as he could learn, of virgin gold, were found at all. 3. Although the buildings discovered are undoubtedly ancient, yet they bear no marks whatever of a higher antiquity than the time of Lord Baltimore's settlement; on the contrary, it is perhaps difficult to imagine them quite so old. And 4. Though the desire of the neighbouring inhabitants is to favour the high antiquity of these remains, yet their evidence, on comparison and cross-examination, is much against it.

On leaving Harbour Grace, Captain Robinson observes: "I have been much pleased with my visit to this port. The harbour is good, and though the space between the end of the bar and the north shore is rather narrow, a large ship, well handled, may beat through, or back and fill in and out with the tide. Approaching the town from the northward you pass a large house, surrounded by some considerable trees, which has an English appearance; as has also the little town, with its parsonage in the centre of a pretty garden, and weather-beaten church, bearing an antique, un-Newfoundlandish air." The Favorite next proceeded to the small island of Belleisle, in Conception Bay, 'which deserves the name of '*Belle*;' wheat ripening well on it, and yielding nineteen-fold; potatoes fourteen-fold; and oats, hay, and vegetables doing equally well. Belleisle will be a nursery-garden to the great embryo towns of Conception Bay; and indeed it is a reproach to Newfoundland that, with many similar spots either on its own territory, or within its waters, it is still dependent on Prince

Edward's Island and Halifax for supplies. But," as Captain Robinson immediately afterwards observes, "fishing has hitherto paid better than husbandry."

The Favorite next proceeded to St. John's, and afterwards returned to England. We shall conclude our extracts, therefore, first, with a brief narrative concerning a poor native woman, which seems to us to exhibit some peculiar aspects of untutored character; and next, with a vocabulary of the language of these people. We are not aware that either has been published before in detail; though the story in its general outline is well known.

"From the war of extermination waged against the natives of Newfoundland by the Mic Macs, who had settled near St. George's Bay, and frequently came over in considerable numbers from Nova Scotia, and from the barbarous treatment which they formerly received at the hands of our early settlers in Newfoundland, they had entirely deserted the sea-coast, and by keeping within their woods and fastnesses, avoided all intercourse with strangers. Captain Buchan's attempt, in 1808, ending in the murder of his two marines left as hostages, appeared also to have put an end to the hopes that were entertained of civilizing this barbarous race. They had, however, of late years frequently ventured down to the houses in the Bay of Exploits, for the purposes of plunder or of mischief; and at length, Mr. Peyton, a settler, having suffered much from their depredations, went up the river with a party of ten or twelve men, to recover his property, and, if possible, to communicate with his spoliators. Having travelled seventy miles on the snow, he surprised three natives at a little distance from their wigwams; one man, who appeared a chieftain, was very untractable, rejecting all overtures of friendship, and at last attacked old Peyton in so ferocious a manner, that the young man, to save his father's life, was obliged to shoot the savage. The woman who was in company, and was, as it afterwards appeared, the wife of the poor victim, did not fly, shed no tears (a savage seldom weeps); but, after a few minutes' violent struggle of emotions, which were visible in her intelligent countenance, anguish and horror appeared to give place to personal fear, and she went to the murderer of her husband, clung to his arm as if for protection, and strange to say, a most devoted attachment appeared from that moment to have been produced towards him, which only ended with her life. To him alone she was all gentleness, affection, and obedience; and the last act of her 'brief, eventful history,' was to take a ring from her finger and beg it might be sent to John Peyton.

"The tribe were in the neighbourhood of this disastrous meeting, and it was necessary that the Peytons should secure their retreat; they had a sley, drawn by dogs, in which Waunathoke, or Mary March (as she was afterwards named, and as we may now call her), immediately placed herself, when she understood she was to accompany the party, and directed them by signs to cover her over, holding her legs out to have her moccassins laced; and both here and subsequently,

by her helplessness, by the attention she appeared habitually to expect at the hands of others, and by her unacquaintance with any laborious employment, indicated either a superiority of station, or that she was accustomed to a treatment of female savages very different from that of all other tribes. She was quite unlike an Esquimaux in face and figure, tall and rather stout-bodied, limbs very small and delicate, particularly her arms; her hands and feet were very small, and beautifully formed, and of these she was very proud; her complexion, a light copper colour, which became nearly as fair as a European's, after a course of washing and absence from smoke; her hair was black, which she delighted to comb and oil; her eyes larger and more intelligent than those of an Esquimaux; her teeth small, white, and regular; her cheek-bones rather high; but her countenance had a mild and pleasing expression (her miniature, taken by Lady Hamilton, is said to be strikingly like); her voice was remarkably sweet, low, and musical. When brought to Fogo, she was taken into the house of Mr. Leigh, the Church Missionary, where for some time she was ill at ease, and twice during the night attempted to escape to the woods, where she must have almost immediately perished in the snow; she was, however, carefully watched, and in a few weeks was tolerably reconciled to her situation, and appeared to enjoy the comforts of civilization, particularly the clothes; her own were of dressed deer-skins, tastefully trimmed with martin, but she would never put them on or part with them; she ate sparingly, disliked wine and spirits, was very fond of sleep, never getting up to breakfast before nine o'clock; she lay, rolled up in a ball, in the middle of her bed. Her extreme personal delicacy and propriety of conduct were very remarkable, and appeared more an innate feeling than any exhibition of tact or conventional usage. Her power of mimickry was very remarkable, and enabled her quickly to speak the language she heard; and before she could express herself, her signs and dumb show were curiously significant. She described the servants, blacksmith, tailor, shoemaker, a man who wore spectacles, and other persons whom she could not name, with a most happy minuteness of imitation. It is a beautiful provision, that savages and children, who have much to learn, should be such good mimics, as without that faculty they could learn nothing, and we observe it usually leaves them when they no longer want its assistance: to this we should often ascribe family resemblances, which we think are inherited. But to return to Mary March;—she would sometimes, though rarely, speak freely to Mr. Leigh, and talk of her tribe. They believe in a Great Spirit, but seem to have no religious ceremonies. Polygamy does not appear to be practised. They live in separate wigwams, Mary's consisted of sixteen; the number was discovered in rather a curious manner. She went frequently to her bed-room during the day, and when Mr. Leigh's housekeeper went up, she always found her rolled in a ball, apparently asleep; at last, a quantity of blue cloth was missed, and from the great jealousy that Mary showed about her trunk, suspicion fell upon her; her trunk was searched, and the cloth found, nicely

converted into sixteen pair of moccassins, which she had made in her bed; two pair of children's stockings were also found, made of a cotton nightcap. Mr. Leigh had lost one; but Mary answered angrily, to all questions about her merchandise, 'John Peyton, John Peyton;' meaning that he had given it her: at last, in the bottom of her trunk, the tassel of the cap, and the bit marked J. L., were found, when, looking stedfastly at Mr. Leigh, she pointed to her manufacture, and said slowly, 'Yours,' and ran into the woods; when brought back, she was very sulky, and remained so for several weeks. The poor captive had two children, and this was probably the tie that held her to her wigwam; for though she appeared, in many respects, to enjoy St. John's when she was taken there, and her improved habits of life, she, on the whole, but 'dragged a lengthened chain,' for all her hopes and acts appeared to have a reference to her return. She hoarded clothes, trinkets, and anything that was given her, and was fond of dividing them into sixteen shares. She was very obstinate, but was glad to be of any service in her power, if not asked to assist; she was playful, and was pleased with startling Mr. Leigh, by stealing behind him softly; her perception of anything ridiculous, and her general knowledge of character, showed much archness and sagacity: an unmarried man seemed an object of great ridicule to her. When she was taken to St. John's, on entering the harbour, she said to Messrs. Leigh and Peyton, 'You go shore, Mr. Leigh—you go shore, John Peyton—when go shore, no emamoose (wife or woman), ha, ha, ha, ha!' She was quite indifferent to music, did not seem to perceive it; liked exhibiting herself to strangers, and was very fond of putting on and taking off all the dresses, ribbons, and ornaments that were given her. Mr. Leigh once drew on a bit of paper a boat and crew, with a female figure in it, going up a river, and stopping a moment at a wigwam, and described the boat, freighted as before, returning. Mary immediately applied the hieroglyphic, and cried out, 'No, no, no, no.' He then altered the drawing, taking the woman out, and leaving her behind at the wigwam, when she cried very joyfully, 'Yes, yes, good for Mary.' A variety of representations, more obscure than this, she perceived with great quickness, and had much satisfaction in the mode of communication

"She remained a short time at St. John's, and acquired such facility in speaking English, that sanguine hopes of conciliating and opening a communication with her tribe, through her means, were entertained; and when Sir Charles Hamilton despatched Captain Buchan to the Bay of Exploits, to make the attempt, it was hoped for this poor devoted handful of Indians that the measure of their sufferings was full, and that they were at last to be brought within the influence and blessings of civilization and Christianity. It was ordered otherwise; the change of dress, or change of living, or whatever it may be, that operates so fatally on savages separated from their native habits, spared not poor Mary. She left St. John's with a bad cough, and died of consumption, on making the Bay of Exploits, aged 24. Captain Buchan, after a laborious march, reached the wigwams, but

found them empty; and he deposited there the coffin of Mary, with her presents, dresses, moccassins, &c. The experiment, I think, was hazardous; the Indians, on returning, may possibly perceive the truth, or they may, as more in accordance with their past experience, fancy poison, insult, or any of the barbarities practised on their forefathers, the tradition of which they carefully preserve."

Vocabulary of the Language of the Natives of Newfoundland; procured by the Rev. J. Leigh, from Mary March, a Native Woman, taken up the Bay of Exploits by Mr. Peyton, in March, 1818.

Arms	memayet
Arrow	dogemat
Boy	bukashamesh
Breast	begomot
Bonnet	abodonce
Beaver	mamshet
Boat or vessel	adothe
Buttons or money,	agamet
Berries	bebidigemidie
Blankets	manovorit
Bear	gwashavet
Blood	izzobauth
Beat	buhashowite
Bite	bashudite
Blow the nose	shegamit
Birch rind	bovish
Body	haddabothie
Back	possont
Baked apples	abidemashick
Clothes	ihingyam
Cod fish	bobboosoret
Cattle, cows, & horses,	nethabeat
Cat (domestic)	abidesook
Cat (martin)	abidish
Canoe	japathook
Cream jug	motheryet
Come hither	kooret
Candle	shaboth
Caplin	shamorh
Cry	matheothice
Comb	edrathin
Cold	moidewsee
Chin	toun
Cut	odisuit
Comet	anin
Currents	shamye
Deer	osweet
Deer's horns	megorun
Dog	mammasmeet
Drawing knife	moeshwadet
Dog-wood (mountain ash)	emoethook
Duck	boodowit
Ducks and drakes,	howmeshet
Dancing	budiseet
Dirt	methie
Eye	givinya
Egg	debine
Eat	odvit
Eyebrow	marmeuck
Elbow	moocus
Ear	mooshaman
Fire	woodrat
Fish-hook	adothook
Feathers	abobidress
Fall	hoshet
Fork	ethewroit
Fishing-line	edat
Flying	meaoth
Fur	peatha
Girl	emamooset
Gloves	obsedek
Gun	adamadret
Glass	hadibirt
Go out	enano
Gull	assow
Gimlet	quadranuck
Grindingstone	aquathoont
Gunpowder	beatothunt
Goose	odeusook
Good night	bethiote

Get up	ganyep
Gaping	abemite
Groaning	cheashit
Gooseberry	jiggamint
Hand	memet
Hair	dronna
House	mammateek
Hammer	mattucis
Heart	begodor
Hare	odusweet
Husband	zathrook
Hoop	uoin
Head	keauthut gonothin
Hiccups	mudyrat
Hatchet	thingaya
Ice	ozeru
Indian (red)	beathook
Indian cup	schucododimit
Iron	mowazeenite
Knife	uine
Knee	hodamishit
Kneeling	abusthibit
Kiss	widumite
Lobster	odjet
Lamp	bobdiduishemet
Lord bird	mammadrouit
Leg	aduse
Lead	gooshcben
Lip	coish
Lie down	bituwaite
Louse	thusebeet
Lightning	barod
Leaves	madyna
Lightning	wieeth
Man	bukashaman
Mouth	mamesook
Moon	kius and washewiush
Musquito	shema bogosthue
Nose	geen
Net	giggarimanet
Necklace, beads	bethee
Night and dark	washew
Nipper	bebadrook
Nails	quish
Neck and throat	iedesheet
Needle	dosomite
Oil	emet
Otter	edree
Ochre	odement
Oar	poodybeae
Oakum	mushabauth
Pin	dosomite
Partridge	zosweet
Puppies	mammasameet
Pitcher cup	manune
Pigeon	bobbodish
Puffin	gwoshuawit
Rocks	ahune
Rain	bathue
Running	hothamashet
Rowing	osavate
Rat	gadgemish
Raspberries	gauzadun
Shoes	moosin
Smoke	besdic
Seal	bedesook
Stinking seal	mattic bedesook
Spoon	adadiminte
Seen	kius and maugerewius
Sit down	athep
Sleep	isedoweet
Saw	deddoweet
Sails	ejabathook
Shovel	godawick
Stockings	gasset
Sword	bedisoni
Salmon	wasemook
Silk handkerchief,	ejibiduish
Scissors	osegeen
Sore throat	anadrick
Snipe	aoujet
Swimming	thoowidgee
Seal sunk	aparetia bedeosok
Scratch	bashubet
Scollop	gowet
Sneezing	adjith
Singing	awoodet
Shoulders	momezemethon

Sorrow	corrasoob
Stooping	hedyyan
Standing	kingabit
Shaking hands,	memanmonasthus
Scab	pigathee
Spruce	trawnasoo
Teeth	bofomet outhermayet
Trap	shebathoont
Trousers	moweed
Trout	dottomeish
Titlass	gotheyet
Turr	geonet
Tinker	oothook
Tickle	kaduishnite
Thank you	thine
Thigh	ifweena
Tongue	memasuck
Thread	meroobish
Throw	pugathoite
Thunder	barodiisick
Thumb	pooeth
Woman	emamoose
Water	ebautho
Watch	ruis
Woodpacker	shebohoweet
Wife	osuck
Walk	woothyat
Warming yourself,	obosheen
Wind	gidgeathue
Wolf	moisamadrook
Wood	adiab
Whortle berries	mamoose
Yawning	jibeath and ibemite

One	gathet
Two	adasic
Three	shedsic
Four	abodoesic
Five	nijick
Six	bigadosic
Seven	odosook
Eight	odoosook
Nine	yeoth odue
Ten	theant
Main land	guuzewook
Islands	mamanasheek

II.—*Private Journal kept on board H.M.S. Leven, when surveying the Coast of Africa.* By Captain Bartholomew, R.N. 1820. MS., pp. 161.

THIS also is a fourteen years old Journal, presented to the society by a friend of the gallant author, who died on the service on which he was then employed, very early in its progress. We are again, accordingly, compelled to select a few extracts, instead of either giving the Journal at length, or a detailed analysis of its entire contents:—

"AZORES.—*St. Michael's.*—Tradition may have handed down, and circumstances may lead to an idea which is entertained by many, that the island of St. Michael was originally a plain covered with beautiful trees, rich verdure, and aromatic plants. At present, however, it consists of a number of mountains, hills, and valleys, none of which are primitive, but evidently the production of volcanic eruptions. The conical figure of the mountains, and the cavity at their summits, the accumulation of lava, scoriæ, and volcanic sand, demonstrate their production by fire.

"Externally the volcanoes appear extinguished, but they are supposed to exist internally, of which indeed the fountains in the Valley of Farnan and other parts of the island are evident symptoms. This valley is about twenty-five miles north and east of Porto del Gardo, and has on its south-east side a small village called Carcuis or Farnan. On a small elevation about a quarter of a mile square are a number of hillocks, on which the action of fire is every where evident. The minerals on the spot are pyrites, lava, pumice, marble, and clay of different colours, ochre, iron ore, and calcareous earth mixed with alum and sulphur. There are also a number of boiling fountains, and many cold springs. The hot springs form several streams, and in their course they smoke and emit sulphureous steams; in a calm day the vapour is seen rising to a great height. The largest of these boiling fountains, called the Caldeira, is nearly thirty feet in diameter, but its depth is unknown. Its water is scalding hot, and in a constant state of ebullition, emitting a vapour highly sulphureous, and smelling like burnt gunpowder; its taste communicates an acescent pungency, and its sediment is a clayey substance of a light blue colour. At a few yards' distance, behind a ridge of lava, and at the bottom of a projecting rock, another boiling fountain is called the Forga or Forge; this is ranked as the second fountain: its surface is seldom visible from the dense sulphureous vapour; it boils with great violence, and sends forth a great noise, throwing up quantities of a fine glutinous blue clay mixed with vapour, which is scattered about and observed to encrust the rock and other neighbouring objects. These are the principal fountains, but there are several others; and vapour is seen issuing out of the crevices of rocks in many places. By applying the ear to some of the fissures, the noise of boiling water is distinctly heard; and from others the water is at intervals squirted out, scalding those who may unwarily approach too near. The temperature of these fountains is not uniform: some are as high as boiling heat, others more moderate, and some very cold; the appearance of the water in some is limpid and transparent, in others turbid, of a white or reddish hue, all generally depositing a red or blue clayey substance. Crystals of alum and sulphur are here found in abundance, some of them beautiful and curious; and when the vapour issues and exudes from the chinks and fissures of the rock, some of the crystals are from one to two inches long. A small river runs through this valley, and on its edge in several places there are hot springs, with at times a perceptible ebullition in the middle of the stream from these springs. This river deposits an ochrey sediment on the stones and pebbles of its bed; in some places the sediment is of a green colour, not unlike martial vitriol; and the bushes on the banks are encrusted over with sulphur and alum.

"The taste of these waters varies. In some it is that of a strong impregnation of the vitriolic acid, in others of the carbonic; in others the taste is aluminous or ferruginous, while others again are perfectly insipid. The country-people in cooking save fuel by those fountains. They place their culinary utensils over the hot springs, or upon some

of the steaming crevices; and their cattle by instinct or experience approach these places to clear themselves of vermin, by standing in the sulphureous steam.

"Not far from the hot springs is a hill of pumice-stone from which several springs of cold water rise, and at the bottom of the hill form a small run or watercourse. In this short distance some of them deposit a pale yellow ochrey sediment, and others one of a higher colour. Their taste is sharp and acescent, their smell ferruginous; the pungency in some is excessively penetrating, and in a glass they sparkle like champagne. About a quarter of a mile to the westward are a number of other hot springs, and this place is the resort of those who use the waters. Farther up the valley are others of the same description. About a mile to the westward also there is a small river named Sanguinolenta (or Bloody River) from its red colour, on the banks of which are several cold springs of a strong ferruginous, acescent taste and smell; and to the southward, beyond a range of mountains, and about a mile distant, are a number of hot springs, in which the same variety is observable as among these described. At this place there is one about twenty-four feet in length, and twelve in breadth; it boils with great force, making much noise; and near it are several cold springs, which are in the same state of ebullition as the hot fountains. They have a sharp acescent taste and smell, and are highly impregnated with the aërial acid.

"St. Michael's has commerce with Lisbon, England, America, and Russia. To Portugal it sends corn, pulse, poultry, cattle, and vegetables, which are paid for in tobacco, sugar, coffee, trinkets, dispensations, indulgences, images of saints, reliques, &c. About seventy vessels are sent annually to England with fruit, receiving woollens, hardware, earthenware, and various necessaries. From America they receive boards, staves, lumber, rice, fish, pitch, tar, iron, and a variety of India goods, which are paid for in wine; and the trade for Russia is similar with America. They have also a ready-money trade with Madeira and the Canary Islands for corn, cattle, and poultry.

"St. Michael's contains 1 city, 5 towns, 54 parishes, and 80,000 inhabitants. They have of regular infantry, 250; artillery, 100; militia, three regiments, 3000; and ordenanza, or levée en masse, about 6000 men. The dress of the principal inhabitants of both sexes is nearly the same as the English; but the male peasantry have a singular covering for the head: it consists of a convex crown, like some of the English leather hats, with a front like a shovel, and turned up like a horn on each side. It is in breadth about eighteen or twenty inches; and a flap hangs down from the crown, buttons under the chin, and covers the shoulders. This dress is peculiar to the islanders of St. Michael. The respect shown an Englishman here is great, every person bows and lifts his hat as he passes.

"The ladies are not much seen abroad, although it is reported that they do not stay much at home. They are, however, kind in the extreme and attentive to strangers, and their hospitality keeps pace with their great attention and politeness.

"I regret much the badness of the weather when I last called at St. Michael's. I had previously arranged that a conveyance should be in readiness as soon as the ship came off the nearest point to the Valley of Farnan, to carry up a number of beakers to be filled with water of the different fountains to bring to England, to be chemically analyzed, but the above-mentioned cause precluded any attempt of the kind. Their efficacy in healing many disorders is well known in the Azores; and were they better known in England, they would probably be resorted to there also.

"*Terceira* is a beautiful island, and, like all the other Azores, of volcanic formation. The climate is delightful, the air generally clear and serene, and the soil so prolific, that almost every European and tropical plant grows on it. The face of the island is diversified with volcanic hills, and gardens, pastures, vineyards, and orangeries serve to enrich the landscape. Fine roads are cut to every part of the island, by which means travelling is much easier in it than in any other; and the island appears better adapted for invalids than Madeira or any of the western islands, as they are thus able to take exercise and recreation. The capital of the Azores, as well as of the island, is Angra, the residence of the civil governor; but the bishop resides at St. Michael's. The population of the island is estimated at 40,717 (this account I was officially favoured with, by permission of the governor), of which one-tenth part are priests; and the town of Angra is said to contain of the above number 8000 inhabitants. About four thousand pipes of wine are considered to be made annually on the island, but this quantity is distilled into brandy; what wine is consumed is brought from Fayal. There are six convents for nuns, and one for married women when their husbands are from home; there are twenty-two parishes, and thirty large churches, with smaller ones to a great extent, of which I could get no certain information. The present governor has done much for the island, by causing good roads to be cut, and compelling the proprietors of ground to let out such land as they do not cultivate themselves to the poor, for what it will bring. This has, within these few years, enriched the island, by raising much more corn than formerly, and given scope to industry. The inhabitants are civil and attentive to strangers; and cleanlier in their persons than at Madeira. They are an innocent, good, and honest people; and although oppressed by their ecclesiastical establishments, they seek distinction by industry rather than arms, preferring the olive-branch to the laurel, and submitting to a yoke which is most galling. The houses in the town are well-built, the streets broad and paved; but a stranger is annoyed in passing, from the number of pigs that feed there, and the noise of the musical carts. Every house has several of those animals, and having no back ground, they are set loose in the streets, and the passenger has often to stop until he clears his way, or is obliged to pass round these animals. And the cart-wheels and axle are fixed together, so that in turning round, the friction of the axle with the

body of the cart makes a great noise, which their owners like, as they say it cheers the bullocks, and makes them go quicker. It is, however, a great annoyance to a stranger, for when two or three of them are together, as is often the case, the noise is so great that two travellers cannot converse together; they cannot be heard when these vehicles are near.

"The island of Terceira contains one city, called Angra; three towns, namely, Praya, St. Sebastio, and New Town; also twenty-two parishes (as by official information, 5th Nov. 1819): viz.—

Names of Parishes.	Population.
The Cathedral	4548
Conception	3145
St. Peter's	2505
St. Lucie	2094
St. Mathus de Colheto	1243
St. Bartholomew	1395
St. Barbara	2310
St. George's, of the Twelve Rivulets	1333
St. Rock, near Altars	1839
St. Peter's, near the Biscoutes	1540
St. Beatrice, of the Four Rivers	921
Our Lady of Anza Olva	1778
Divine Holy Ghost of New	1351
St. Michael's of Lagas	1895
Our Lady in the Fount	958
Mother of the Holy Cross in Praya	3594
St. Catharine, opposite to Praya	1830
St. Barbara, Bastard Fountain	820
Mother of St. Sebastio	1301
St. Anthony of Jew Port	1202
St. Peter of Little River	1871
St. Bento near Angra	1013
Total	40,717

"The yearly produce of Indian corn, wheat, and a trifling quantity of barley, is on an average about 720,000 bushels; with 4000 pipes of wine, and 50 tons of Orchilla weed; though, if pains were taken to collect it, there would be more. The military force consists of 1200 regular troops, 2000 militia, and, in case of an attack, the inhabitants are all obliged to arm themselves with a long pike (or what they drive the bullocks with, being a goad about ten feet long), from the age of fifteen to sixty years.

"People of property, and those in business, both men and women, imitate the English in dress; the males of the lower class wearing short jackets, with trousers or smallclothes, and blue cloth caps of a curious shape, trimmed with red or brown; the females wearing black bombasin skirts, and a hood attached, which they pull up over their heads, and which serves as a cloak when they walk abroad;

in the house it is thrown back. The women in general are rather handsome, but have an awkward and loitering gait.

"The custom at table is the same as observed in most parts of Portugal; all the different articles are cut up, and being put on separate plates or dishes, are handed round, one after another. Ladies and gentlemen therefore help themselves; and I have seen some persons help themselves on one plate from four or five different dishes. Every one fills his glass or tumbler, and drinks what he pleases; the cloth is kept on the table until the company rise, and very little wine is taken after dinner.

"The coast round Terceira is high and craggy, excepting in a few places; and those accessible are well defended with batteries: round the bay and town of Angra, in particular, the fortifications are strong and well-built.

"In coming from the eastward, the land about Porto Praya is first made; and in advancing towards Angra, the Frailes, four rocks above water, and Goat Islands, are next seen. The latter appear to have been at first one island, of volcanic production, but by some subsequent earthquake, the middle part has disappeared, leaving a narrow passage of a cable's length in breadth, and twenty-four fathoms in depth. Their former union seems evident by comparing the strata on both sides of the passage, the layers of the different substances agreeing in quality, colour, and dip of direction. Between these islands and the main there is an excellent channel, upwards of two miles in breadth, with a clear sandy bottom, and fifteen fathoms water; and in case of emergency any ship can anchor. Between Goat Islands and the Frailes, the passage is two miles in breadth, with nine fathoms water, and is clear from all danger; but to the southward, about three-quarters of a mile, there is a rock under water, which must be carefully avoided. The Bay of Angra is open to all winds from S.S.W. to E.; and the safest months for lying there are June, July, August, and September, when the winds from north to west prevail; but there are more vessels in October, November, and December, than any other months, for fruit. They moor to the northward of Fort St. Antonio, which is on the west and north side of the bay, with three and four anchors ahead; and vessels farther out, on the least appearance of its coming to blow, run out to sea.

"Tofiño's plan of the bay is correct. I made the south pillar on Brazil Mount to be in 38° 38′ 17″ latitude, and 27° 14′ longitude, by the mean of three chronometers."

"CAPE VERD ISLANDS.—*Fuego.*—This island is fertile, and produces a great quantity of Indian corn, beans, and all sorts of refreshments. Excellent cloths are made here for the trade of Guinea, and for the use of various inhabitants of the other islands. The climate although warm is healthy, on account of the rarefaction of the air caused by the volcano. There are several beaches for boats; but the only anchorage for vessels of burthen is on the west side of the island, in the bay called Luz. The Leven's anchorage was the north point of the island

N. 20° E.; extreme south point S. 68° E.; north flag-staff N. 85° E.; south flag-staff S. 21° E., in twenty-five fathoms soft sand, nearly abreast of the well, and off shore one quarter of a mile. The water is not good, and is also scarce, the well being down on the beach, which is a soft black sand, although the water comes from the rock. When there is a high sea or surf, it breaks over, as well as penetrates through, the sand, and renders the water brackish. The inhabitants, as well as their cattle, have to descend a precipice of eighty feet in height by a path cut in a zigzag direction in the rock to get to this well.

" *Brava.*—This island is very high, and could be seen at a great distance, were it not constantly covered by a dense atmosphere. The climate is however temperate, healthy, and fertile; and the island produces a large quantity of Indian corn, beans, and all sorts of refreshments, but little or no wood. The anchorages are four in number, but not one of them safe for vessels of burthen; only small vessels consequently frequent them for orchilla and grain.

" There are two small islands on the north-east side of Brava, called Rombo or Romes Islands, distant about five or six miles. These islands are nearly joined with other small rocks, some parts being above water, and forming a crescent. Between the westernmost island, which is lofty and having a peak on it, and the next rocks, is a passage of about half a mile wide, and having twenty-five fathoms water; and the easternmost island has a reef of rocks which extends nearly two miles partly under water, and in an E.N.E. direction. To the southward there is a clear passage between the above and the north end of Brava: the Leven at the west end of this channel had soundings eighty fathoms; the state of the weather did not allow her to pass entirely through, but, from observation, in a case of emergency any ship may take the passage, keeping about mid-channel.

" *St. Vincent.*—This island is mountainous and much exposed to winds. There are plenty of cattle, but very lean, in the dry season many dying for want of food. The island produces orchilla and some cotton; but there are no refreshments to be found at it, the inhabitants being mostly supplied with corn and fruit from St. Antonio. There is an excellent bay called Porto Grande, one of the largest and safest in the Cape Verd Islands. Vessels can anchor at any depth from five to eighteen fathoms, perfectly sheltered from all winds; and plenty of good wood is to be got here; but the water that is obtained from a well on the north side of the bay is not good, especially in the dry season, and is also scarce. There is another bay on the south-west side, called St. Pedro, which is of a middling size, with a fine sandy beach; and vessels can anchor here in ten fathoms, near the middle of the bay, or rather more to the westward. It is a good anchorage in the dry season, and the inhabitants say there is plenty of good water and wood. The American vessels employed in the whale-fishery frequent this bay.

" The rollers were setting high at the time I was there, which prevented me from examining it carefully. There is another anchorage on the east coast, called Do Pria da Gatta, with a sandy beach, near

which vessels may anchor in six fathoms; the bottom is clear, but a sea sets directly in when the wind is either north-east or south-east, the island of St. Lucie sheltering between these points. This bay and coast are without wood, water, or inhabitants.

"*St. Antonio.*—This island is very high, abounding with springs; and, from its being so mountainous, it has continued dews, causing a great production of corn, and all sorts of refreshments. Much orchilla is also gathered here, and cotton in great abundance; by means of the latter a good trade is carried on with the coast of Guinea, but the roads, on account of the mountains, are miserable. The coast all around is clear, and although there are not any ports in the island, there are several anchorages.

"*Do Porto da Ponta do Sol.*—This cannot be termed a port (although the Portuguese give the name of port to any place in which small craft can anchor); it is only a part of the coast where the bottom is good. To this place, however, all vessels to and from the island trade; the custom-house and warehouses are also here, situated on a point of land, to the westward of which is the anchorage, about three-quarters of a mile from the shore, sheltered from the wind from west to east by the south; and although the N.N.E. and N.E. winds blow directly in, from the height of the mountains they are not felt, only causing a heavy swell which occasions vessels to roll much. The landing place is excellent, being a natural basin in the rock; its entrance is about eighteen or twenty feet wide, and is there so narrow, that you must give the boat good way, and then toss up the oars in passing the entering points, not having length for them; it then widens, and no sea can affect a boat lying there. Good water is obtained here, and every sort of refreshment at a reasonable rate; wood also can be procured, but it is brought down from a great distance. The town in which the governor resides is about three miles from this point, the road to it being cut out of the rocks in many places. To the westward of this, several miles, is a large bay, called the Port of the Mountain of Wheat, from a large mountain at the back of it; it has a sandy bottom with small pebbles. Vessels can anchor in from eleven to twelve fathoms in safety any time of the year, and water and wood can be had, but few refreshments, owing to the great distance from the village, and there being no inhabitants except a few shepherds who occasionally reside here.

"*Bay of Tarrafal.*—This is large and spacious, having a black sandy bottom. Vessels anchor in twenty fathoms, three-quarters of a cable's length from the shore, sheltered from the north-east and south winds and sea; and when the wind comes to the westward of south or north, from the extreme high land it is always a calm in the bay, the wind never blowing home, only occasioning a swell to set in.

"The Leven's anchorage was in forty fathoms; North Point Bay, N. 11° W.; South Point, S. 47° W.; the well or watering-place, N. 55° E.; distant three cables' length from the shore. Here is the best water in all the Cape Verd Islands; it comes from the moun-

tains, in a continued run all the year, in a ravine; and there are three reservoirs built, which are continually kept full, persons being appointed to fill them, in the event of a very dry season. A small well is also dug on the beach, and when a vessel calls for water, her casks are carried to the well, the water is then turned off from the lower reservoir, which is about three-quarters of a mile distant, and descending in a regular run, cut in the rocks, it fills the well regularly to the degree you empty it; and a line-of-battle ship may complete in one day her water. Having an order from the governor for the water, I had only to victual four men who superintend; but they make merchant-vessels pay for it besides. The charge, however, is trifling. Wood is brought down by the natives: it is said to be good, but I did not see any of it. Refreshments can be also had here, but on account of its being nearly fourteen leagues from the village, they are not abundant. A ship touching there should call at Point Sol, she could there be supplied with bullocks, sheep, poultry, and fruit, at a low price, get an order for the water, and proceed here, not anchoring at Point Sol, only standing off and on. Thus, in one day, everything could be got down she required. Refreshments can, nevertheless, be obtained at Tarrafal, but the people are dilatory and exorbitant. I never experienced water to keep so well, nor so clear, as that I got here.

" *St. Lucie* is of a middling height, and there is a bay on the south-west end where small vessels may anchor; it is sheltered from all points excepting south and south-east, and has a sandy beach; the anchorage, small pebbles and sand. In the middle of the bay is a small island, with the ruins of a village on it; but the island is now totally deserted, only fishermen frequenting it. There are many turtle here, and much orchilla is gathered, as also some cotton, which had been formerly planted, but is now in a wild state. The channel between this island and St. Vincent is not foul, as represented on the charts; I entered it from both sides, and sent boats in all directions, but no rocks were to be found; and in the mid-channel, halfway through, the least water was fourteen fathoms.

" *Branco.*—Between this island and St. Lucie the Leven lay at anchor several days, during the time we were surveying the island and exploring the channels. Her position was, extremes of St. Lucie, N. 44° W. to N. 30° E.; centre of Branco, S. 7° E.; extremes of St. Nicholas, from S. 72° E. to S. 45° E.; extreme point of St. Vincent, N. 60° W.; in eleven fathoms, hard and white sandy bottom.

" This island is high and rugged; has a well on it, and some decayed small wood; and on the south-east side a long sandy spit runs out; but the rollers were so violent it could not be examined. I attempted landing twice, but was obliged to abandon the design.

" *Razo* is low, the salvage of the coast steep and rocky; the landing is, therefore, difficult when there is any wind. This island is barren, inhabited only by birds; and between it and Branco, about one-third off the former, is a coral shelf, in the form of a house-roof, running S. S. W. and N. N. E., having on its shallowest part six

fathoms, and deepening gradually on the west to fifteen fathoms, and on the east to eighteen and twenty fathoms. Although its ridge has so much water, however, the sea continually breaks heavy on it, owing to a strong tide that sets through between these islands; the passage is notwithstanding safe.

"*St. Nicholas* is high, having two remarkable mountains on it, which can be seen at the distance of fifteen leagues, one in the shape of a sugar-loaf, called the Peak of Trade, which is the middle of the island; the other, on the west end of the island, called Monte Gordo. The island is fertile, and refreshments can be procured at a low price; but water and wood are difficult to be obtained. There is a bay, which the natives call Carrical, known to the English by the name of Freshwater Bay, on the south side of the island, and about eight or nine miles from the east point. It is likewise, on some charts, termed Porto Preguica. This bay has a black sandy beach, over which, in a ravine, you will perceive a number of canes or green bushes. Vessels may anchor in ten fathoms, sheltered from the north-east winds. A few inhabitants reside here in small huts. The water is got by digging a well in the beach. There is also a pond behind the beach, from which you can fill; but in high tides the sea breaks over, and renders the water in the pond brackish.

"Refreshments can only be had at the old port; this is situated eight or nine miles N.E. b. N. of Point Vemalhania, or Red Point, which is the southernmost point of the island; and in it are the king's warehouses, and a little fort above them. At the distance of four miles from this fort is the town, where the governor and bishop reside. There is safe anchorage here for small vessels; but they cannot be supplied with water to a great extent. A well has been cut, distant from the sea-side two hundred fathoms, for the purpose of relieving any vessel in want, but the quantity it produces is but trifling."

III.—*Aide-Mémoire du Voyageur, ou Questions relatives à la Géographie Physique et Politique,* &c. Paris, 1834. 12mo. pp. 519.

THIS work is published anonymously, but is in fact the acknowledged production of one of the most active correspondents of the Royal Geographical Society, Colonel Jackson, of St. Petersburgh. It is a traveller's guide, or vade-mecum, destined, as the title further expresses it, *à l'usage des personnes qui veulent utiliser leurs voyages;* and its object is thus of great interest and importance.

In a preliminary discourse, or introduction, Colonel Jackson first traces the history of discovery: then comments on the benefits which have accrued to the human race by its progress; and concludes with some observations on the qualities, original and acquired, which a scientific traveller ought to possess. We subjoin

a few extracts from this portion of the work, premising that we have in some degree altered the order in which we have found them. The observations are important:—

"Pour entreprendre les voyages avec fruit, il faut y être préparé, et comprendre, dans toute leur étendue, les devoirs qu'ils imposent. Nous nous permettrons quelques détails à ce sujet.

"Une constitution robuste et une grande activité corporelle sont indispensables. Il faut pouvoir supporter les extrêmes du chaud et du froid, du sec et de l'humide, les fatigues et les privations. Il y a aussi un âge pour voyager; trop jeune ou trop vieux, on est trop faible et de corps et d'esprit.

"Quant aux qualités morales, il faut réunir la douceur et la patience à l'énergie et à la fermeté, la prudence à la bravoure.

"Le voyage qu'on veut entreprendre doit être précédé de l'étude des cartes et de la lecture des descriptions du pays qu'on se propose de visiter; il faut surtout savoir la langue qu'on y parle; toutefois, il arrive souvent qu'on ne peut apprendre d'avance l'idiome d'un peuple; on doit alors s'y adonner sur les lieux, et dès l'arrivée, si le temps qu'on peut y passer permet d'en prendre la peine.

"Le voyageur, dès qu'il est arrivé, ne saurait mettre trop d'attention à se concilier la bienveillance des habitans. Il ne doit jamais blesser leur amour-propre, ni faire la satire de leurs mœurs: quelque ridicules que puissent être leurs manières, leurs superstitions ou leurs préjugés, il doit se garder de s'en moquer. S'il parvient à leur inspirer de la confiance, il peut se permettre, avec circonspection, de leur démontrer les avantages qu'il pourrait y avoir, pour eux, à renoncer à des usages barbares ou absurdes. En un mot, il doit chercher à se ménager des amis partout où il se trouve; de cette manière, il se fera ouvrir des sources d'informations qu'autrement il chercherait en vain. Il serait très avantageux au voyageur de posséder quelques connaissances en médecine, surtout s'il doit séjourner quelque te[illegible]rmi des sauvages. Dans tous les cas, le dessin lui est nécessaire; la musique même est un accessoire souvent plus important qu'on ne pense.

"Il faut encore ajouter que le voyageur doit, autant que possible, tout voir et tout vérifier par lui-même; lorsqu'il est forcé de se contenter de descriptions qui lui sont faites par d'autres, il doit accueillir ces renseignemens avec beaucoup de circonspection; qu'il soit surtout exact dans ses récits: le vrai, quelque aride qu'il soit, vaut toujours mieux que le faux merveilleux.

"Les voyages de découvertes ont été tellement multipliés qu'il n'existe plus de terres inconnues, si nous en exceptons quelques petites îles de peu de conséquence, qu'on pourrait encore trouver; mais il existe des régions immenses non explorées, et des peuples sur lesquels nous n'avons, jusqu'à présent, que des notions très imparfaites. Nous sommes encore bien loin de connaître toutes les productions de la terre, et l'intérieur de l'Afrique, de la Nouvelle-Hollande, du Labrador, etc., peut renfermer dans les trois règnes, des richesses dont nous n'avons nulle idée.

"Les voyageurs qui visitent les pays civilisés de l'Europe doivent le faire dans le but de savoir au juste l'état des hommes et des choses dans ces contrées ; ils doivent encore s'informer des progrès toujours croissans des arts et des sciences, et rapporter dans leur patrie tout ce que ces objets peuvent présenter d'intéressant. Ceux qui visitent des pays moins connus chercheront à établir des relations commerciales, ou au moins des rapports d'amitié qui puissent ouvrir de nouveaux débouchés à l'avantage réciproque des peuples, et pour le bien général de l'humanité.

"Mais le voyageur doit non-seulement pouvoir tout observer en détail, mais encore savoir étudier l'ensemble. Ce genre de recherches, fait sur les lieux mêmes, ne peut manquer de présenter un grand intérêt ; mais il exige une vaste érudition et une sagacité profonde.

"Tout, dans le monde, est enchaînement de causes et d'effets ; tout est action et réaction. Une nation prospère quand tout est national. L'agriculture doit être conforme au climat et au sol ; l'éducation conforme à l'intelligence des habitans ; les institutions doivent être basées sur la constitution physique du peuple, et sur l'étendue de sa capacité morale. Or, savoir démêler, dans le vaste ensemble des causes et des effets qui ont produit l'état présent d'un peuple quelconque, l'utile et le nuisible, le vrai et le faux, les principes et les conséquences, tel est le talent d'un esprit supérieur. Aussi voyons nous rarement de ces voyages philosophiques qui approfondissent ces matières.

"Il faut commencer par étudier l'état actuel de chaque objet, et rechercher ensuite s'il est tel qu'il devrait être par rapport à l'ensemble ; si tout est bien, il faut soigneusement démêler les principes qui ont produit un résultat si satisfaisant ; mais si, au contraire, l'harmonie ne règne pas dans l'ensemble, on doit tâcher de découvrir la source de ce défaut dans l'organisation générale, proposer même un remède convenable.

"On ne peut guère espèrer, il est vrai, que sur l'opinion isolée d'un voyageur, quelque instruit, quelque sage qu'il paraisse, on modifiera les institutions d'un pays ; mais les lumières qu'il répand provoquent les recherches et les discussions, et souvent même il suffit de relever un abus, d'indiquer un avantage quelconque, pour qu'on en profite aussitôt. D'ailleurs, ce qui importe le plus, c'est d'étendre le commerce, et, avec lui, la richesse et la civilisation. Le voyageur, en conséquence, ne doit rien négliger pour faire connaître à ses compatriotes les avantages qu'ils peuvent tirer de relations commerciales avec le pays qu'il décrit, les points principaux où ce commerce peut s'effectuer ; les objets qui y trouveraient le débit le plus assuré, et ceux qu'on aurait en échange ; les colonies et les comptoirs qu'on pourrait y établir, etc. Il doit s'enquérir, en même temps, de tous les procédés avantageux suivis dans les arts, et qu'il serait facile d'imiter. En un mot, il faut qu'il observe les hommes et les choses, et qu'il fasse tout ce qui dépend de lui pour améliorer leur état, par les renseignemens qu'il donne et les mesures qu'il propose."—*Disc. Prél.*, xxxiv.—xl.

Having thus explained the qualities and views with which scientific travellers should be endowed and animated, Colonel

Jackson proceeds in the body of his work to suggest the inquiries to be made by them. These he classes under the following heads. I. Those which relate to the country under examination itself; viz., 1. Its geography, including its position, boundaries, length of frontier line, extreme length and breadth, extent of surface in square measures, general aspect, physical and political divisions; 2. Its hydrography, including a view of its springs, rivulets, torrents, rivers, *canals*, lakes, marshes, conterminous seas, &c.; 3. Its meteorology, including its climate, winds, tendency to fogs, periodical rains, snow, greater or less abundance of dew, thunder and lightning, optical deceptions, other meteoric phenomena, &c. II. Those which relate to the productions of the country; 1. Animal; 2. Vegetable; 3. Mineral. III. Such as relate to its inhabitants, as 1. Their number, rate of increase or decrease, circumstances explanatory of either, their divisions, morals, moral and physical temperament, language, dress, food, &c.; 2. Their habitations, the extent and interior distribution of these, and whether separating males from females generally, their furniture, &c.; 3. The distribution of the population into towns, villages, hamlets, detached houses, &c.; 4. Establishments, religious, educational, charitable, medical, of police, military, commercial, industrial, scientific, prisons, facilities for travelling and the transmission of letters, amusements, the court of the sovereign, system of government general and particular, &c. IV. Questions relating to the industry of the country; 1. Agricultural; 2. Manufacturing; 3. Commercial. V. Special questions touching its more important institutions, as 1. Its religion; 2. Form of government; 3. Legislative power; 4. Finances; 5. Their appropriation and expenditure; 6. The transmission of letters and general service of the post. VI. Those which regard the state of science and literature in a country. VII. Those which regard the fine arts in it. VIII. Those which relate to its history. IX. Those which relate to its military capabilities. And X. Those which regard its foreign relations.

On all these topics Colonel Jackson furnishes certain elementary views from which his questions are deduced; and in a small 4to. volume annexed, he gives models of tables in which the information obtained may be conveniently arranged. His work is thus decidedly an improvement on any previous traveller's guide which we have seen: yet its plan is not quite so complete as might be wished, notwithstanding; and we take the liberty, therefore, of also noticing, in all courtesy, what appear to us some deficiencies, for his own future consideration, should his work, as it deserves, reach successive editions.

We miss, in the first place, a preliminary essay on the principles and objects of statistical inquiry generally. Such an introduction

would both give interest to the details which Colonel Jackson invites the attention of his readers, and would also, we think, probably modify his own arrangement of them. For example, in such an essay, the importance of acquiring a distinct notion of the means of internal communication enjoyed by any country could not be overlooked; and its *canals* would, consequently, find a more appropriate place than as an item in its hydrography, with which, by the way, they can scarcely be said to have any connexion. Again, the geology of a country would scarcely, in such case, be in name almost overlooked; and in substance divided under two heads, the aspect of the country, and its mineralogical productions. Nor would the facilities for the transmission of goods be considered merely as an element in the appreciation of the *commerce* of a country, instead of entering largely into a consideration of the development of national character and manners. Nor would inquiries into the nature and extent of crime in a community be overlooked entirely in a list of interesting questions relating to it. Nor would sundry other instances occur, in which, as we think, the importance of certain classes of details has either been over-estimated, or their application to the solution of much more important inquiries than those to which they immediately refer been unnoticed.

But there is another want in the volume before us, the supply of which, though not perhaps strictly within its plan, we would earnestly recommend to the attention of its active and intelligent author; or to any other who may desire to compete with him in the composition of an improved traveller's manual.

There are few things less understood by young travellers—and it is for them chiefly that such works are written—than, on the one hand, the amount of preparation requisite to enable them to do anything at all in the way of mapping, or otherwise describing the physical or moral aspect of a country; and on the other hand, the maximum result which may be obtained from any given amount of such preparation, with suitable knowledge, diligence, and opportunities. For example, some may be instructed even by such elementary information as this, that in mapping with imperfect instruments little can be done without starting from one fixed point, and terminating in another; that a compass is necessary to take bearings, and an instrument for measuring vertical angles, with some sort of artificial horizon, or substitute for it, to determine latitudes; but that with these instruments, and a careful observation of distance and true direction traversed, even longitudes may be computed with considerable accuracy; that there are various summary methods, as by a comparison between the velocity of light and sound, by which distances may be estimated: others,

as by an examination of the length of shadows, or the angles at certain distances subtended by buildings, by which heights may be computed: others, as the temperature of boiling water, by which the elevation above the level of the sea, or depression beneath it, may be approximated to: others again, as the number of children in families, the comparison of legitimate and illegitimate births, the standard of domestic morality, the number and character of prevailing crimes, the character of prevailing amusements, the number of extremely aged individuals, &c., from which important statistical inferences may be drawn, even though precise figures are not obtained. Not but that figures are always desirable, if possible: it may be said, indeed, that for the higher, that is to say the economical purposes of statistical inquiry, nothing *certain* is known without them, and even with them, from hasty generalizations, or imperfect combinations of particulars, many supposed results are fallacious. But for the purposes of *description*, which is all that geography *directly* contemplates, much is gained by the record even of these approximations; and what young travellers seem to us therefore to want, is not so much a minute detail of questions, four-fifths of which can only be answered in highly civilized states of society, where the importance of replies to them is fully recognized by the resident population, and where consequently little new or exact is left to be gleaned by an occasional traveller,—as an exact knowledge of the preparation and appliances requisite to enable them to devote their attention with advantage to any particular branch of inquiry,—a just appreciation at the same time of the maximum result which may be obtained from any given amount of such preparation, and of the means by which such result may be made a maximum,—comprehensive views on the objects and purpose of statistical inquiries generally, —with such a classification of these as shall disentangle their intricacies, allowing individuals who cannot grasp the whole to choose their section, and at the same time exhibit the bearing of all on the one great point, which is ultimate in geography—the acquisition of an exact and comprehensive view of the physical and moral aspect and condition of any given portion of the human race.

Such, at least, is our idea of what is wanting in a traveller's manual; and we are persuaded that Colonel Jackson will readily pardon the freedom of these remarks, in favour of their intention. It is due to him, moreover, to add, that his work, as it is, may be confidently recommended as a highly useful companion to all intending travellers; that the tables in it are well devised, and many of them original; and that what we have above desiderated are not so much omissions in his plan, as desirable features in

another and more extensive one. As a further example, also, of the assistance that may be derived from it, we subjoin the concluding paragraphs of the section on meteorology:—

"Pour résumer ce que nous avons dit sur les météores de toute espèce, il faut remarquer que les notions que nous avons données sur chacun en particulier, font assez voir le genre d'observations qu'ils exigent; mais les faits isolés ne nous instruisent guère sur la météorologie générale d'un pays, ni sur la nature de son climat; c'est ainsi que l'observation des phénomènes que peut présenter un météore quelconque n'a d'intérêt qu'autant qu'elle est liée avec celle de toutes les autres circonstances météoriques qui l'accompagnent, qui la précèdent et qui la suivent.

"Dans la plupart des villes de l'Europe, on tient des regîtres très exacts et très détaillés des phénomènes météorologiques. Les observations doivent être soigneusement faites avec de bons instrumens, et, à l'exception des météores qui n'ont lieu que rarement, on les observera tous trois fois par jour. On verra ci-dessous la manière de tenir ces regîtres, et d'en déduire les résultats moyens.

"Le tableau No. 2 montre la manière dont doivent être enregîtrées les observations journalières. Le thermomètre sert à indiquer le degré de chaleur ou de froid de l'air, le baromètre sa pression, l'hygromètre son état d'humidité, l'anémomètre la force et la direction des vents, l'eudiomètre la qualité de l'air, l'électroscope le degré et la nature de l'électricité dont l'air est chargé, et les changemens qui surviennent pendant les orages et le passage des nuées. Ces instrumens doivent être tous de la meilleure construction, et bien comparables avec ceux en usage dans les principaux lieux où se font des observations pareilles.

"On fera avec ces instrumens des observations soignées et exactes, trois fois par jour: le matin, à midi, ou plutôt à deux heures, et le soir; on les enregîtrera à l'instant même, chacune dans la colonne qui lui est destinée. On marquera également dans la colonne intitulée *état du ciel*, si le temps a été beau, couvert, pluvieux, neigeux, etc. Quant à la pluie, on observera la quantité qui en est tombée ou la quantité d'évaporation. Quelle que soit l'heure dont on ait fait choix pour les observations sur la pluie, il faut toujours les faire à la même heure, afin d'avoir constamment la quantité de pluie ou d'évaporation pour les vingt-quatre heures. Dans la colonne des phénomènes particuliers, on placera tous les phénomènes, tels que les orages, le tonnerre, les arcs-en-ciel, les aurores boréales, etc. Et dans les remarques on indiquera tous les détails qui méritent d'être notés, tels que l'apparence particulière des nuages, la forme particulière et la grosseur de la neige, de la grêle, la durée et tous les détails de l'apparence qu'auraient présentée l'aurore boréale, les tempêtes, etc.

"Quant à l'eudiomètre, il faut observer que, comme des expériences réitérées ont donné dans tous les lieux à-peu-près les mêmes résultats*, il n'est guère nécessaire, et il est même rarement d'usage de

"* Selon le Chevalier Davy, l'air de l'Europe, de l'Asie, de l'Afrique, et de

faire des observations suivies avec cet instrument; on ne s'en sert qu'à des époques où l'on a lieu de croire que des évènemens ou des phénomènes particuliers auraient pu influer sur la composition de l'air, et alors les résultats de ces observations peuvent être consignés dans la colonne des remarques. On continuera journellement les observations de cette manière, et à la fin de chaque mois on fera le calcul de termes moyens, en s'y prenant de la manière suivante.

" On additionne toutes les observations faites dans un mois avec le thermomètre, soit le nombre de degrés 1430; on divise ensuite cette somme par le nombre d'observations qu'on aura faites, soit 90 (à raison de trois observations par jour), et on aura pour quotient 15,8 degrés; c'est le terme moyen de la chaleur pour chaque jour du mois. Si dans un mois d'hiver on a des degrés au-dessus et au-dessous du terme de la congélation, on fait deux sommes, l'une des degrés au-dessus de 0°, et l'autre des degrés au-dessous, on retranche la plus petite de la plus grande, et on divise le reste par le nombre total des observations. Supposons que, la soustraction faite, il reste 14 degrés de froid à diviser par 93, on ajoute un 0 à 14 pour avoir des dixièmes de degrés, et on divise 140 par 93 (nombre d'observations si le mois avait 31 jours); par ce moyen on trouve que le froid moyen a été de — 0,2°. La barre indique que les degrés ou les fractions de degrés sont au-dessous du terme de la congélation, et le zéro suivi d'une virgule marque qu'il n'y a point de degrés entiers, mais seulement des dixièmes de degrés exprimés par le chiffre qui suit la virgule.

" Quant aux observations barométriques, on commence par additionner les lignes; à l'égard des pouces, si le baromètre a été pendant le mois entre 27 et 28 pouces, alors on n'opérera que sur la somme des lignes; s'il a été plusieurs fois à 28 pouces et au-delà, on comptera le nombre de fois, et on ajoutera autant de fois 12 lignes à la somme des lignes déjà additionnées; s'il a été plus souvent au-dessous de 28 pouces, on comptera le nombre de fois qu'il a été au-dessous de ce terme, et on retranchera autant de fois 12 lignes de la somme déjà trouvée. On divisera le reste par le nombre total des observations.

" Pour avoir des termes moyens par rapport aux vents, on additionnera ensemble toutes les observations des vents qui ont le plus généralement dominé pendant le mois; par exemple, si on a remarqué que le vent du nord a été le plus fréquent, on fera la somme des forces avec lesquelles ce vent a soufflé, et on divisera cette somme par le nombre de fois qu'il a été observé. Le quotient donnera la

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l'Amérique, diffère très peu dans la proportion de ses ingrédiens. L'analyse de l'air, dont on a rempli un ballon de verre à la hauteur de 20,000 pieds au-dessus de la mer, a donné le même résultat que l'air pris à sa surface. On pourrait croire que le gaz acide carbonique, étant le plus lourd de tous les gaz, devrait se trouver en plus grande quantité, sinon seul à la surface de la terre; mais De Saussure l'a trouvé au haut du Mont-Blanc. La Pérouse pourtant n'a pas pu le trouver sur le pic de Ténériffe. On trouve dans les *Mémoires de Manchester* le détail des expériences qu'a faites Dalton pour expliquer l'homogénéité de l'air atmosphérique de tous les climats et à toutes les hauteurs."

force moyenne avec laquelle le vent du nord (le vent régnant) a soufflé pendant le mois*.

" Les observations de l'eudiomètre et de l'électroscope n'admettent guère un calcul de termes moyens ; tout ce qu'on peut faire à cet égard est de noter ce que les observations avec ces instrumens ont pu présenter de remarquable.

" Pour l'état du ciel on observera quelle espèce de temps a été la plus générale pendant le mois. Ce sera le seul résultat qu'exigera cette partie.

" Quant à la pluie et à l'évaporation, on fera tout simplement l'addition des quantités. Quelques observateurs ont l'usage de défalquer ensuite la quantité d'évaporation de la quantité d'eau tombée, mais c'est une opération qui ne mène à aucun résultat utile ou exact ; car en été la somme de l'évaporation surpasse de beaucoup la quantité d'eau qui tombe, et en hiver c'est tout le contraire ; d'ailleurs ces sommes ne peuvent jamais se balancer, puisqu'il tombe une humidité inappréciable en forme de rosée, de bruine, etc., dont on ne tient aucun compte, quant à la quantité, et on calcule rarement comme eau la neige et la grêle qui tombent, etc. On doit donc, pour ce qui regarde la pluie et les observations de *l'atmomètre*, se borner au simple énoncé de la quantité de pluie qui est tombée durant le mois, et de l'évaporation qui a eu lieu. Ce qui ne donne au reste qu'un aperçu général, et seulement comparable de mois à mois, ou d'année à année.

" Des phénomènes particuliers et des remarques partielles, on en fera un résumé ou une remarque générale pour tout le mois.

" Tous ces différens résultats moyens obtenus, on les consignera, ainsi que les extrêmes des observations, dans un tableau semblable au No. 3.

" Dans la première colonne de ce tableau intitulée *mois*, on mettra dans l'ordre de leur succession régulière les douze mois de l'année ; dans la seconde, *date*, on mettra la date du jour de chaque mois où la chaleur a été au plus haut degré ; et dans la troisième, le degré de cette chaleur tel qu'on la trouvera marquée dans le tableau No. 2. Ensuite, dans la quatrième et dans la cinquième colonne, on mettra la date du jour et le degré de moindre chaleur ; dans la sixième colonne, on marquera le degré de chaleur moyenne, tel qu'on l'aura obtenu par l'opération déjà indiquée et consignée au bas du tableau No. 2.

" On suivra précisément la même méthode pour les observations barométriques et hygrométriques ; de même pour les observations des vents, on indiquera la date du jour où le vent a été le plus fort dans chaque mois, avec sa direction, et le degré de sa force, ainsi que la direction et la force moyenne des vents dominans de chaque mois.

" * Ou, si on le trouve bon, on peut mettre dans la colonne intitulée *direction*, le nombre de jours que chaque vent a soufflé ; et dans la colonne *force*, la force moyenne de ce vent : ainsi 6 jours Nord, 12 jours Est, etc. ; et en bas, séparé par une ligne, le vent dominant. Cet arrangement changera l'indication en tête de la colonne, qui, dans ce cas, au lieu d'être *vents dominans*, sera *résumé des vents*."

" Si on a supprimé la colonne de l'eudiomètre dans le tableau No. 2, on la supprimera également ici, rejetant dans la colonne des remarques le peu d'observations qu'on aura pu faire avec cet instrument.

" *Electroscope et eudiomètre;* les résumés déjà indiqués dans les remarques du tableau No. 2.

" *Etat du ciel le plus habituel;* dans cette colonne on placera le temps le plus habituel qu'on a eu pendant chaque mois, tel que beau temps, temps pluvieux, couvert, orageux, etc.

" *Pluie.* On y mettra la totalité de la quantité de pluie qui est tombée, et de l'évaporation qui a eu lieu, comme nous l'avons précédemment indiqué.

" *Phénomènes particuliers.* On spécifiera tous ceux qui ont eu lieu pendant chaque mois, et dans la colonne des remarques tout ce qu'on trouvera digne d'être consigné sur les évènemens météoriques qu'on aurait observés.

" Pour obtenir ensuite les résultats extrêmes et moyens d'une année d'observation, on opérera sur les douze mois de l'année, précisément de la même manière que nous l'avons indiqué pour les trente jours d'un mois, afin d'avoir le résultat de ce mois; c'est-à-dire, qu'après avoir tiré une ligne en bas du tableau No. 3, comme on le voit sur ce tableau même, on met sous la seconde colonne, la date du jour et le nom du mois où la chaleur a été la plus forte, sous la troisième le degré de cette chaleur. On fait la même chose pour les deux colonnes suivantes de la moindre chaleur, et sous la sixième colonne on met le terme moyen obtenu en divisant par douze la somme des degrés indiqués dans cette colonne. On procède de la même manière pour les observations du baromètre, de l'hygromètre et de l'anémomètre. A-t-on fait des observations sur la qualité de l'air et son état électrique, on y mettra leur résultat pour l'année. Pour l'état du ciel on mettra son état le plus habituel; et quant à la pluie, on mettra la somme totale de pluie et d'évaporation, en additionnant les colonnes. A l'article des phénomènes on mettra seulement les plus importans, et dans les remarques ce qu'on trouvera digne d'être noté.

" Ce résumé sera intitulé *résultat de l'année*, tel qu'on le voit dans le tableau No. 3.

" Desire-t-on avoir les résultats extrêmes et moyens de chaque mois de l'année moyenne, il faut comparer, mois par mois, toutes les tables de chaque année, semblables à la précédente, et en déduire des résultats moyens, en divisant la somme des observations par le nombre d'années d'observation.

" Si l'on voulait avoir les résultats moyens pour chaque jour, il faudrait rapprocher les observations faites chaque jour du mois pendant cinq, six, dix ans, plus ou moins, par exemple, du premier janvier de chaque année. Additionnez alors toutes les observations faites le premier janvier de chaque année, et divisez par le nombre d'années, le quotient donnera la chaleur moyenne, l'élévation moyenne du baromètre, pour le premier janvier de l'année moyenne. On fera le même travail pour chaque jour de l'année.

" Voici comment il faut dresser la table pour les résultats de chaque mois, année commune. (Voyez tableau No. 4.)

" On mettra en tête du tableau le nom du mois: soit pour janvier, comme dans l'exemple. Dans la première colonne on mettra les années, dans la seconde les degrés de plus grande chaleur, dans la troisième les degrés du plus grand froid, dans la quatrième la chaleur moyenne, dans la cinquième la plus grande élévation du baromètre, dans la sixième la moindre élévation, dans la septième l'élévation moyenne, dans la huitième la plus grande humidité, dans la neuvième la moindre humidité, dans la dixième l'humidité moyenne, dans la onzième la quantité de pluie, dans la douzième la quantité d'évaporation, dans les huit colonnes suivantes le nombre de fois ou de jours, si l'on veut, que le vent a soufflé des rumbs indiqués en haut de ces colonnes; dans la vingt-et-unième le nombre de jours qu'il a fait beau, dans la vingt-deuxième le nombre de jours mauvais, dans les vingt-troisième, vingt-quatrième et vingt-cinquième le nombre de jours qu'il a plu, neigé ou tonné; dans la vingt-sixième l'énumération des phénomènes célestes, et dans la vingt-septième et dernière les remarques générales.

" Cette table étant remplie, plus ou moins, on tirera une ligne horizontale en bas. On additionnera les colonnes et on prendra les termes moyens en divisant ces sommes par le nombre d'années; ce qui donnera les résultats moyens et extrêmes pour le mois de janvier, année commune. On fera la même chose pour chacun des autres mois."

IV.—*Narrative of an Expedition through the Upper Mississippi to Itasca Lake, the actual Source of this River; embracing an Exploratory Trip through the St. Croix and Burntwood (or Broule) Rivers; in* 1832. Under the direction of Henry R. Schoolcraft. New York. 1834. 8vo.

" American geography," says Mr. Schoolcraft, "may be said to have had three important problems to solve, in modern times: the first and second of these related to the source of the Missouri, and to the course and termination of the Columbia; both were substantially resolved by the expedition of Lewis and Clark, under the administration of Mr. Jefferson. It is to be borne in mind, however, that but one of the three forks, up to which the Missouri was traced, has been explored; that its two north-western branches have not been ascended; and that, consequently, we do not actually know which of its primary tributaries is the longest, or brings down the greatest volume of water.

" The true source of the Mississippi, which forms the third topic of inquiry, was brought into discussion at the same period; and immediately after the acquisition of Louisiana, the American govern-

ment sent an officer, with a suitable body of men, to determine it. Lieutenant Pike, who was selected for this service, did not, however, set out early enough in the season (1805) to accomplish the object. After the selection and purchase of the site, on which the fort near the Falls of St. Anthony is now situated, he encountered delays in ascending the rapids characteristic of that part of the Mississippi. Winter overtook him before reaching the junction of the De Corbeau. He prepared for its severities by erecting a block-house, for the security of his provisions and men. He then proceeded with a small detachment on snow-shoes to Sandy Lake and Leech Lake, two points of central influence, which were then occupied by the North-West Fur Company.

"No further effort was made to explore the sources of the Mississippi for several years. In 1820, Governor Cass, then administering the government of Michigan Territory, and exercising jurisdiction over Indian affairs, obtained the sanction of the general government to visit the region. He left Detroit with a party of thirty-eight men, including the gentlemen composing his suite, during the latter part of May. He was supplied for a journey of four months. After traversing the coasts of Lake Huron, and visiting Michilimackinac, he proceeded north-westward, by ascending the primitive summit at the Falls of St. Mary, went through the extended and picturesque basin of Lake Superior, and first struck the waters of the Upper Mississippi at Sandy Lake. To this point he was accompanied by the military escort, and by the train of larger canoes employed to transport stores and baggage. But the fatigues which the men had undergone in crossing portages, added to the low state of the water, induced him to form a permanent encampment at this place; and he proceeded with a select party, in canoes, to explore the Mississippi.

"It was the middle of July when the expedition reached Sandy Lake, and the difficulty of subsisting so large a party in so remote a position, with the constant claims of suffering and hungry tribes, who presented themselves at every point, began to be severely felt. The exploring party, which was now organized, went out under a sense of these circumstances, and with a feeling of the responsibility pressing upon the claims of the expedition in other quarters, which limited the time applicable to the ascent. They entered the Mississippi on the 17th of the month, and found a strong current, with alluvial banks, and a vegetation indicative of a fertile soil. For the distance of about one hundred and fifty miles, above this point, the party found no diminution in the average strength of the current, which was frequently accelerated by rapids. The latter then assumed a more formidable aspect for ten or a dozen miles, at the end of which they were terminated by the falls of Peckágama. At this cataract, the river, which below has its course through alluvial banks, densely wooded, is compressed between rocks of granulated quartz, over which it rushes with a velocity which would seem to threaten destruction to any species of craft that should attempt the descent. It

became necessary, at this point, to transport the canoes and baggage from two to three hundred yards over land.

"On reaching the Peckágama summit, the channel of the Mississippi was found to flow more directly from the west, with a comparatively sluggish current. But the most distinctive trait of this part of the river was found to consist of a series of extensive savannahs, through which the river displays itself in the most elaborate windings. The junction of the Leech Lake branch takes place at this plateau, at the computed distance of fifty-five miles above the falls. After passing this point, the course of the river is again, generally, from the north-west, about forty-five miles to Lake Winnipec, a handsome body of clear water, estimated to be ten miles broad. The course of the ascent is then west, for about fifty miles, at which distance the river is found expanded into a more considerable lake, presenting an area of limpid water of, perhaps, 120 square miles. This sheet, which has subsequently been found to be the largest expansion of the Mississippi, is since denominated Cass Lake. It was the highest point reached. The party entered it on the 21st of July. The question of pursuing the stream farther, was then submitted by Governor Cass to the gentlemen composing his party. Anxious as all were to see the actual source of so celebrated a stream, their wishes were controlled by circumstances. Inconveniences had been felt from leaving the supplies at so considerable a distance below; and as the waters were found to be low, and the preparations inadequate for a journey of indefinite extent, a decisive opinion was expressed in favour of a return from this point. This decision was immediately carried into effect.

"From the best information that could be obtained, the Mississippi was represented to have its origin in a lake called *La Biche*, supposed to be sixty miles distant in a north-west direction. Upon this estimate, the length of the river was computed to be 3038 miles, and by a series of approximate estimates, its altitude placed at 1330 feet above the Atlantic. Numerous rapids and lakes were, however, stated to exist in this remote part of the stream, and a degree of vagueness and uncertainty exhibited in relation to it, which evinced, that the traders, who were relied on for information, either had seldom frequented it, or preserved an indefinite recollection of its geographical features."

Such was the state of public information on this point in 1820. In 1830, Mr. Schoolcraft first received instructions to renew the attempt, to which a desire to restore peace between the Chippewas and Sioux further stimulated the American government. In 1831, he reached the upper course of the Mississippi from Lake Superior for the purpose; but the waters were so low, that it was found impossible to ascend the river. In 1832, the expedition was more fortunate; and succeeded in fully exploring the sources of this great stream. It may be sufficient to take up

its proceedings from Cass Lake, the farthest point previously attained:—

"Every arrangement being completed on the evening of the 10th, we embarked at three o'clock the next morning. Our course lay westward, through a strait, formed by the approach of a part of the island to a part of the main shore. We then passed two islands, called Garden and Elm islands. The morning was too hazy to give us any extensive prospect of the lake, or its shores. We had been a little more than an hour in motion, when we found ourselves nearing the western head of the lake, and the men soon shoved our canoes upon a sandy beach, with the exclamation of *un portage*. We found this portage to extend about fifty yards, over a plain of sand, bearing pine, and terminating on the banks of a small lake. Through this lake the Mississippi has its course, and the two lakes are connected by a circuitous channel, which might, perhaps, have occupied half, or three-quarters of an hour to ascend. The lake, for which we heard no name, is several miles in extent. We passed it transversely, and entered the channel of the river on its western border. It presents a still current, with an edging of savannah, which, at no great distance above, is again expanded around the margin of another lake, called Tascodiac. Hills of sand, covered with yellow pines, here present themselves, and the river exhibits for several miles above, either a sand bank, or a savannah border. Time is the only measure of distance which we had the means of referring to. About eight o'clock, rapid water was encountered, and at this point, which may be fifteen miles above Cass Lake, the meadow lands cease. Boulders, of a primitive character, are found on the rapids. The rapids are such, in their force and inequality of depth, as to require the men frequently to wade, and pull up the canoes. There are, say, ten of these principal rapids, in the ensuing twenty or twenty-five miles, at which distance we reach the most northern point of the Mississippi, which is marked by the fine expanse of the Pamitchi Gumaug, or Lac Travers. This lake may be fifty feet above the level of Cass Lake. It is about twelve miles long, from north to south, and six or seven broad, with elevated shores, presenting to the eye a beautiful vista of hard wood groves.

"We were an hour in crossing the lake south-westwardly, and were impressed with the extent and beauty of the prospect. On gaining the opposite shore, we found the Mississippi flowing with a brisk and deep current into it, and exhibiting a width of perhaps one hundred and fifty feet. In landing a few moments at this point, we found the beach strewed with small shells, both uniones and helices. A log-house, used as a winter trading camp, stood a few hundred yards northwardly; and this may be referred to as the most advanced trading location on the main waters of this river.

"Lac Travers is separated by a short channel, from a bay or lake of moderate dimensions, which is from its proximity considered a part of the main lake, although the current of the separating channel indicates the latter to be rather a *river* than a strait. It will be con-

venient to refer to it, as it is from this point that the Mississippi, which has now been pursued to its utmost northing, is ascended directly south. About four miles above this bay, the Mississippi has its ultimate forks, being formed of an east and west branch, of which the west branch is decidedly the largest and considerably the longest. Reasons indicated by our guide, induced him to conduct us up the east branch, which we soon found expanded into a small lake, denoted Marquette, and not far above into another denoted La Salle. We were twenty-four minutes in passing through the last, and on leaving it found the stream strikingly diminished in volume, with a limited depth, and a vegetation of a more decidedly alpine character. About four miles higher the stream expands into a lake, six or seven miles in length, and about half that distance in width. This lake, which is called Kubbakunna, The Rest in the Path, presented a pleasing aspect after the sombre vegetation we had passed below. Rushes, however, were abundant toward its head, and we found the ground too low and wet for encamping. After ascending the river for a distance, we put ashore for the night at a point of woods extending into the marsh-land constituting the river margin. The soil at this place appeared to be of the most frigid character. A carpet of moss covered it, which the foot sank deep into at every step. The growth was exclusively small grey pine, with numerous dead branches below, and strikingly festooned with flowing moss. Nearer the margin of the river, alder, tamarack, and willow, occupied the soil. As night approached it commenced raining, which served to add to the natural gloom of the spot.

"We resumed the ascent at five o'clock in the morning, (12th.) The course of this branch of the river above the Kubbakunna Lake resembles a thread wound across a savannah valley. A species of coarse marsh-land grass covers the valley. Clumps of willow fringe this stream. Rushes and Indian reed are gathered in spots most favourable to their growth. The eye searches in vain for much novelty in the vegetation. Wherever the stream touches the solid land, grey pine and tamarack are conspicuous, and clumps of alder here take the place of willow. Moss attaches itself to almost every thing; and there is a degree of dampness and obscurity in the forest, which is almost peculiar to the region. Water fowl seem alone to exult in their seclusion, and evince the infrequency of intrusion by flying a short distance, and frequently alighting within gun-shot.

"At half-past five we came to an elevated sand-hill on the right shore covered with yellow pine, and presenting a naked face towards the river. As one of the canoes required mending, I directed the men to land at this spot for that purpose. Oza Windib, who was a little in the rear, at the moment said on coming up, that we were within a few hundred yards of the junction of the Naiwa, the principal tributary of this fork; that a series of rapids commenced at that point, which would render it necessary to make a portage the whole extent of them, and that it was better to commence the portage at this place, as the river so ran, that we might go directly back through

the forest and strike its channel. He said that the Naiwa, which came in on the left, was a stream of considerable length, and originated in a lake which was infested by copper-head snakes, to which its name has reference. I observed that the soil at this place was of a diluvian character, and embraced pebbles, and small boulders of syenite, trap-rock, and quartz, and other debris of primitive and secondary rocks. One of the party picked up a well-characterized piece of zoned agate.

"While the mending of the canoes was in progress, the baggage was put in portable order, and as soon as all was ready, the men moved on with the canoes and effects, which were so arranged that all could be carried at one load, and it did not require them to go back. This was a point originally kept in view, in the curtailment of the baggage at the island, and it was an object of the highest importance to the speed and success of the trip. Each canoe and its apparatus, with some of the lighter pieces was carried by one man. The guide led off the men, with no slight burden on his own shoulders, first scrambling up the sandy acclivity, and then striking through a growth of scrub oak and pines. The showers of the morning had so thoroughly wet the grass and shrubbery, that a few moments walking through it was sufficient completely to saturate both pantaloons and stockings. I walked out a few hundred yards from the trail, towards the left, which brought me into the curve of the river in view of the rapids. There appeared to be a series of small rapids, with intervening shallows. The noise of falling water and the white wreaths of foam induced me to think there might be distinct falls, but I could discern nothing entitled to the name. The entire descent of the river at this series of rapids appeared to be, however, considerable, and might perhaps be estimated at forty-eight feet. I rejoined the party at the spot they had selected for their first pause, somewhat to their relief, probably, as guns had been fired by them, under the belief of my having missed the way. We first came in sight of the river again, on the brow of an elevated sand-hill precipitous towards the water. The guide halted to inquire whether it would not be preferable to encamp at this spot, as we should suffer less from insects than if we encamped in the valley of the river at the termination of the portage. As the daylight was not gone, and some distance still remained, I deemed it better to go on, that we might have nothing to do in the morning but to put our canoes in the water. On reaching the bank of the stream, we found its current placid, and our guide informed us that we had now surmounted the last rapids.

"A fog prevented our embarking until five o'clock in the morning, (13th,) and it was then impossible to discern objects at a distance. We found the channel above the Naiwa diminished to a good-sized brook, more decidedly marshy in the character of its shores; but not presenting in its plants or trees anything particularly to distinguish it from the contiguous lower parts of the stream. The water is still and pond-like. It presents some small areas of wild rice. It appears to be a favourite resort for the duck and teal, who frequently rose up

before us, and were aroused again and again by our progress. An hour and a half diligently employed, brought us to the foot of Ussawa Lake: we halted a moment to survey it. It exhibits a broad border of aquatic plants, with somewhat blackish waters. Perch abound in it. It is the recipient of two brooks, and may be regarded as the source of this fork of the Mississippi; we were precisely twenty minutes in passing through it. We entered one of the brooks, the most southerly in position; it possessed no current, and was filled with broad-leaved plants, and a kind of yellow pond-lily. We appeared to be involved in a morass, where it seemed equally impracticable to make the land, or proceed far by water. In this we were not mistaken; Oza Windib soon pushed his canoe into the weeds and exclaimed, *Oma, mikunna,* (here is the portage.) A man who is called on for the first time to debark in such a place will look about him to discover some dry spot to put his feet upon; no such spot however existed here; we stepped into rather warm pond water, with a miry bottom. After wading a hundred yards or more, the soil became firm, and we soon began to ascend a slight elevation where the growth partakes more of the character of a forest. Traces of a path appeared here, and we suddenly entered an opening affording an eligible spot for landing. Here our baggage was prepared for the portage. The carbonaceous remains of former fires, the bones of birds, and scattered camp poles, proved it to be a spot which had previously been occupied by the Indians. The prevailing growth at this place is spruce, white cedar, tamarack, and grey pine. We here breakfasted.

" Having followed out this branch of the Mississippi to its source, it may be observed, that its existence as a separate river has hitherto been unknown in our geography. None of the maps indicate the ultimate separation of the Mississippi above Cass Lake into two forks. Little surprise should therefore be manifested that the latitude of the head of this stream is found to be incorrect. It was not however to be expected that the inaccuracy should be so great as to place the actual source an entire degree south of the supposed point. Such, however, is the conclusion established by present observations.

" The portage from the east to the west branch of the river is estimated to be six miles. Beginning in a marsh, it soon rises into a little elevation of white cedar wood, then plunges into the intricacies of a swamp matted with fallen trees obscured with moss. From this the path emerges upon dry ground; it soon ascends an elevation of oceanic sand, having boulders and bearing pines. There is then another descent, and another elevation; in short, the traveller now finds himself crossing a series of diluvial sand ridges, which form the height of land between the Mississippi Valley and Red River. This ridge is locally denominated Hauteur des Terres, where it is crossed, in passing from Lac Plaie to Ottertail Lake, from which point it proceeds northward, separating the tributaries of the River des Corbeau from those of Red River. It finally subtends both branches of the Mississippi, putting out a spur between the east and west fork which

intersects the portage, crosses the west or Itascan fork about the point of the Kakábikonce or Little Rock Falls, and joining the main ridge passes north-eastwardly of Lac Travers and Turtle Lake, and is again encountered in the noted portage path from Turtle Lake to Red Lake; it is, in fine, the table-land between the waters of Hudson's Bay and the Mexican Gulf. It also gives rise to the remotest tributaries of the river St. Louis, which through Lake Superior and its connecting chain may be considered as furnishing the head waters of the St. Lawrence. This table land is probably the highest in North-western America in this longitude.

"In crossing this highland, our Indian guide, Oza Windib, led the way, carrying one of the canoes as his portion of the burden; the others followed, some bearing canoes and others baggage; the whole party were arranged in Indian file, and marched rapidly a distance; then put down their burthens a few moments, and again pressed forward. Each of these stops is called a *posè* by the voyageurs, and is denominated Opugidjiwunon, or a place of putting down the burthen, by the Indians. Thirteen of these rests are deemed the length of the portage; the path is rather blind, and requires the precision of an Indian eye to detect it: even the guide was sometimes at a loss, and went forward to explore. We passed a small lake occupying a vale about midway of the portage in canoes; the route beyond it was more obstructed with underbrush; to avoid this, we waded through the margins of a couple of ponds, near which we observed old camp poles, indicating former journeys by the Indians.

"To the geologist the scene is one of interest; the boulders of granite and other primitive strata occurring on the surface, remind him of the original position of these masses in the system of nature, and indicate revolutions affecting the earth's surface, which have widely changed both the position and form of these solid materials. When the soil itself is examined, it adds further evidences of such changes. We may refer its sand to consolidated strata of this mineral which have been broken down by oceanic action, and distributed in the remarkable ridges and elevations which now characterize the face of the country. In whatever light the subject is viewed, it seems difficult to resist the conclusion, that water has been the cause under Providence in effecting these changes; and that the highest grounds in this region have been subjected to the peculiar influence which this element alone exerts in the work of attrition and deposition of strata, solid or diluvial. It might be interesting to inquire in what manner this agent of change was withdrawn, and whether a current was created toward any of the cardinal points. It would aid this inquiry to observe, in which direction the debris and soils were deposited in the heaviest masses? How far granite boulders had been carried from their beds? And whether wood, bones, and other organic remains had been subjected to like removals? We think these accumulations are abundantly witnessed in casting the eye down the Mississippi valley, with a measured decrease in the size and weight of the pulverized masses, in proceeding from the head to the mouth of

this river. It is thus evident, that the heaviest boulders are found on its upper branches, while they become rare in its central plains, and disappear altogether, long before its entrance into the deltas at its mouth. And this remark may be coupled with the accounts given by travellers of the bleak, and denuded, and sterile character of the northern rock formations.

"But we have no leisure to devote to this investigation, and must proceed with the narrative that is before us. Every step we made in treading these sandy elevations seemed to increase the ardour with which we were carried forward. The desire of reaching the actual source of a stream so celebrated as the Mississippi—a stream which La Salle had reached the mouth of a century and a half (lacking a year) before, was perhaps predominant; and we followed our guide down the sides of the last elevation, with the expectation of momentarily reaching the goal of our journey. What had been long sought, at last appeared suddenly. On turning out of a thicket into a small weedy opening, the cheering sight of a transparent body of water burst upon our view. It was Itasca Lake—the source of the Mississippi.

"Itasca Lake, the *Lac la Biche* of the French, is, in every respect, a beautiful sheet of water, seven or eight miles in extent, lying among hills of diluvial formation, surmounted with pines, which fringe the distant horizon, and form an agreeable contrast with the greener foliage of its immediate shores. Its greatest length is from south-east to north-west, with a southern prolongation, or bay, which receives a brook. The waters are transparent and bright, and reflect a foliage produced by the elm, lynn, maple, and cherry, together with other species more abundant in northern latitudes. The lake itself is of irregular form, which will be best illustrated by the accompanying sketch. It has a single island, upon which we landed, after an hour's paddling from the spot of our arrival and embarkation. We found here the forest trees above-named growing promiscuously with the betula and spruce. The bones of fish and of tortoise, found at the locality of former Indian camp-fires, indicate the existence of these species in the lake. We observed a deer standing in the margin of the lake: and here, as well as throughout the lakes of the region, found the duck, teal, and loon in possession of their favourite seclusions. Innumerable shells (a species of small helix) were driven up on the head of the island. Other parts of the lake yield small species of the unio, which were found strewing the bed of the outlet; and it may here be remarked, that this shell exists, in the largest and heaviest species heretofore known, in the lower parts of this stream—the Mississippi having its origin here.

"The outlet of Itasca Lake is perhaps ten or twelve feet broad, with an apparent depth of twelve to eighteen inches. The discharge of water appears to be copious, compared to its inlet; springs may, however, produce accessions which are not visible, and this is probable both from the geological character of the country and the transparency and coolness of the water.

"The height of this lake above the sea is an object of geographical interest, which, in the absence of actual survey, it may subserve the purposes of useful inquiry to estimate. From notes, taken on the ascent, it cannot be short of 160 feet above Cass Lake. Adding the estimate of 1330 feet, submitted in 1820, as the elevation of that lake, the Mississippi may be considered to originate at an altitude of 1490, say 1500, feet above the Atlantic. Its length, assuming former data as the basis, and computing it, through the Itascan or west fork, may be placed at 3160 miles; 182 of which comprises an estimate of its length above Cass Lake. Its general course, in *ascending*, above the latter point is north of west as far as Lac Travers; then south to its primary forks, which is continued, following up the east fork to Kubbakunna Lake, and for some distance farther. It then varies a short distance north and north-west, then south-west and south, and finally south-west, to its main source in Ussawa Lake. The portage thence to Itasca Lake is west-south-west. Both these lakes appear to rise in springs on the height of land. They are separated by about six miles of country. Their latitude we had no means of accurately determining: from daily notes of the courses and distances, kept by Lieutenant J. Allen, as indicated by a compass and watch, their position is, however, shown to be *south-west*, and not, as heretofore supposed, *north-west*, of Cass Lake: they are, in fact, a little south of west from Leech Lake, which is placed on our best maps in 47° 16′. The highest northing attained by the Mississippi is on the great diluvial plateau, containing the contiguous waters of Lakes La Salle, Marquette, and Travers, which cannot vary more than a few minutes from forty-eight degrees. These facts will explain the error of the elder geographical writers, who supposed that the parallel of forty-nine degrees would intersect the Mississippi. Its origin in the remote and unfrequented area of country between Leech Lake and Red River, probably an entire degree of latitude south of Turtle Lake, which still figures on some of our maps as its *source*, throws both the forks of this stream out of the usual route of the fur trade, and furnishes perhaps the best reason why its actual sources have remained so long enveloped in obscurity.

"The Mississippi River traverses more degrees of latitude than any other river in America, and the remark might perhaps be extended to the habitable globe. The extremes of its changes in climate and vegetable productions are consequently very great. It occupies above a thousand miles of the distance between the arctic circle and the equator. Long as it is, however, it has a tributary longer than itself (the Missouri). Like the Niger, its mouth was discovered by expeditions down its current; but, unlike that stream, which has so long held the geographical world in suspense, its sources have been also sought from its central parts. Its entire course is at length known; and we may now appeal with full certainty to the Balize and to Itasca Lake as its extreme points: at the latter, it is a placid basin of transparent spring water; at the former, it is as turbid as earth in suspension can make it, and carries a forest of

floating trees on its bosom. Below the junction of its primary forks it expands, at very unequal distances, into eight sheets of clear water, each of which has features worthy of admiration: four of these, Lac Travers, Cass Lake, Winnepec, and Lake Pepin, are lakes of handsome magnitude and striking scenery. The number of its tributaries, of the first, and the second, and the third class, is so large, that it would furnish a labour of some research to determine it. The Missouri, the Ohio, and the Arkansas, are of the noblest class. Whoever has stood at the junction of these streams, as the writer has done, must have been impressed with an idea of magnitude and power which words are incapable of conveying. The broadest parts of its channel lie in the central portions of its valley; its depth is great in all its lower parts, and increases as it flows on to the Gulf, and its general descent and velocity are such as to appear very striking characteristics. Noble views arrest the eye of the observer in every part of its diversified course. Originating in a heavy and extensive bed of diluvial soil, superimposed upon primitive strata, it soon wears its channel down to the latter; and, after running over them for several hundred miles, plunges at length, at the Falls of St. Anthony, over the carboniferous limestone formation which is so prevalent and so valuable for its mineral deposites below that point. This is finally succeeded by diluvial and alluvial banks, the latter of which are semi-annually enriched by fresh deposites, and exhibit a delta as broad and as exuberant as the Nile. Like the latter, it has its cataracts in the Falls of St. Anthony and Pukaigama, and in numerous lesser leaps and cascades, where its current is tossed into foam, and threatens destruction to the navigation. Such are its physical traits, and these enough in their character, magnitude, and variety, to lead our contemplations irresistibly 'through nature up to nature's God.'

"Having gratified our curiosity in Itasca Lake, we prepared to leave the island, but did not feel inclined to quit the scene without leaving some memorial, however frail, of our visit. The men were directed to fell a few trees at the head of the island, thereby creating an area for the purpose of erecting a flag-staff. This was braced by forked stakes, and a small flag hoisted to its place. Taking specimens of the forest growth of the island, of a size suitable for walking-canes, and adding its few species to our collections of plants and conchology, we embarked on our descent. The flag which we had erected continued to be in sight for a time, and was finally shut out from our view by a curve of the lake. We found this curve drawn out in such a manner as to form, with the opposite shore, the channel of the outlet. We soon felt our motion accelerated by a current, and began to glide with velocity down a clear stream, with a sandy and pebbly bottom, strewed with shells, and overhung by foliage. Ten feet would, in most places, reach from bank to bank, and the depth would probably average over a foot; the water was not, however, equally distributed. A strong and winding channel made it a labour of active watchfulness for the canoe men, to keep our frail vessels from being dashed against

boulders, or torn in pieces by fallen timber or overhanging trees. Chopping with the axe was frequently necessary to clear the passage, and no small labour was imposed by getting through the drift wood, piled up at almost every sudden bend. We were almost imperceptibly drawn into a series of rapids and petty falls, where the stream was more compressed and the water deepened; but the danger rendered tenfold greater by boulders of blackened rocks and furious jets of the stream. We were rather hurled than padled through these rapid passes, which increased in frequency and in fury as we advanced. After being driven down about twelve miles of this species of navigation, during which the turns are very abrupt, the river displayed itself, so to say, in a savannah valley, where the channel is wider and deeper, but equally or more circuitous, and bordered with sedge and aquatic plants. This forms the first plateau; it extends eight or nine miles. The river then narrows and enters another defile, beset with an almost continued series of rapids.

"At a place called Kabábikons, or the Little Rock Falls, we made a short portage; two of the canoes, however, made the descent, but not without imminent peril, and a delay eventually greater than if they had been carried across the portage. We descended this second series of rapids, a distance of about nine miles, and encamped at a late hour on a high fine bank; having come, altogether, about thirty-two miles below Itasca Lake. Wearied with the continued exertion, the frequent wettings, and the constant anxiety, sleep soon overtook the whole party.

"We were in motion again a little before five o'clock in the morning (14th). The rapids continued. The branches of large trees often hung so near to the water, that if we were not in peril of being entangled, like the Jewish rebel king, we were in a more continual danger of having every moveable article swept from the canoes. An accident thus occurred to one of the canoes, about six o'clock in the morning, which might have had a fatal termination.

"The character of the stream made this part of our route a most rapid one; willing or unwilling, we were hurried on. Yet I am not aware that any important object was neglected. Where there is much sameness in natural features, frequent landings are unnecessary; and whoever has devoted his time in going thus far up the Mississippi, will have made himself familiar with its plants, soil, and productions. The pine, in its varieties, is the prevailing tree; and whenever we get out of the narrow alluvions of the valley, arenaceous plains appear. Among the plants that border the river, the wild rose, which is so conspicuous on all the streams north-west of Lake Superior, is very often seen; the salix, so common to the lower Mississippi, and so uniformly infested with musquitoes, presents itself on the first plateau, and is afterwards one of the constant shrubs on the savannahs.

"The river continues to descend in steps. The second series of rapids was followed by a second level, or plateau, in which the channel assumes a width nearly or quite double to that which it pre-

sents on the rapids. On this level the Cano River comes in, as a tributary, on the right shore. The volume of water is perceptibly increased by it. This plateau may extend nine miles. It is succeeded by rapids of a milder character, below which the river again displays itself in savannahs, with a comparatively wide, winding channel. These are finally terminated by short and easy rapids which bring the river out of what we may designate as its alpine passes.

"At four o'clock, we came to the junction of the Piniddiwin, a tributary from the left, having its origin in a lake, and entering the Mississippi amidst an extensive marsh of rice, reeds, and rushes, which give it rather the appearance of a marsh than a lake. It is, however, called *Lac la Folle*. This spot was estimated to be 104 miles below Itasca Lake.

"About eighteen miles below the junction of the Piniddiwin we debarked, for the purpose of cooking supper, and preparing our canoes for a night descent, as the channel of the river was now sufficiently broad, deep, and equable to justify it. An *Ocant Ekinabic* was killed at this place. Lieutenant Allen, wishing daylight to finish tracing the river to its junction with the east fork, encamped here. By the time we were ready to embark, clouds had overcast the moon, which afforded a clear light before; but we trusted to our experienced guide, on a part of the river familiar to him, and we had no cause to repent of our confidence. Several shots were fired during the night at deer standing in the edge of the water. The men landed at one spot, and pursued an animal supposed to have been wounded. We found ourselves at the junction about half-past one o'clock in the morning (15th). Having given notices of our ascent of the river thus far, it is unnecessary to add to them."

To the above we may also add the following:—

"Cass Lake has been estimated to be within a few miles of 3000 from the Gulf of Mexico, and to lie at an elevation of 1330 feet above that point of the Atlantic waters; its distance north-west of Sandy Lake is about 270 miles, and of Fond du Lac 420 miles. Estimates make it 182 miles below the true source of the Mississippi in Itasca Lake, and 60 south of Red Lake. It receives Turtle River on its northern shore. This river is ascended through eleven small lakes, a distance of about 38 to 40 miles to its origin in Turtle Lake, once deemed to be the source of the Mississippi. There is a portage from the lake, for light packages of goods, across the summit-level of the Mississippi valley into Red Lake, and the fertile valley of Red River. The latter embraces the settlements planted by the Earl of Selkirk; the inhabitants of which maintained their existence for several years against the strenuous opposition of the North-West Company, and they appear now to be in a state of comparative prosperity, under the direction of a local governor, council, and clergy."

Mr. Schoolcraft's volume also contains the "Journal of an Exploratory Trip through the St. Croix and Bois-Brulé District,"

lying directly south of the head of Lake Superior; respecting the physical geography of which, and also of the present condition of its Indian inhabitants, he gives some interesting notices. Three Appendices conclude the work, one containing the contributions to "Natural History" made by the expedition; the next an essay on the "Chippewa Substantive;" and a third, his "Official Correspondence." The accuracy of some of his philological views regarding the Indian Languages, contained in the second of these, is disputed by a gentleman, Mr. Howse, of Cirencester, who is now preparing for publication, under the patronage, and at the joint expense, of the Royal Geographical and Church Missionary Societies, a Grammar and Vocabulary of the Cree Language. Some examples of the discrepancy between the two authorities we subjoin.

"Mr. Schoolcraft's remarks on the Indian language offer a few points on which a difference of opinion may be entertained; among others are the following:—

"1st. Mr. Schoolcraft says, page 95, 'Pronouns are inflected for tense, and in this shape supply the want of our auxiliary verbs.'

"The joining together of words not necessarily connected is, for many reasons, not desirable. It has, indeed, been the usage, in discussing these North American languages, to unite even the *nominative*, the *auxiliary particle*, and the accompanying *verb* together; but it is an inconvenient practice, as may be seen by the vocabulary of Cotton, the usefulness of which has been greatly lessened by thus unnecessarily increasing the difficulty of detecting the *verbal root*, and so far rendering it inaccessible to all but the practised Indian scholar. Mr. Jones, also, in his 'Translation of the Gospel of St. John' (published by the British and Foreign Bible Society, London, 1831), has, but most probably without the most remote thought of imitation, generally followed the same method; and this I at present consider to be the chief, if not the only drawback in his respectable work.

"Mr. Schoolcraft, however, seems inclined to unite only *two* of these; viz., the nominative and its accompanying auxiliary, considering the *latter* as an *inflection of the former*. *This*, however, is a point I cannot concede to him, for, with all due respect to his views, I am *decidedly* of opinion that the *auxiliaries*, *ke*, *kah*, *ka*, *tah*, &c. (Jones's orthography), far from being inflections, are *independent*, *uninflectible*, *interchangeable* particles; and that, in the following instances from the first chapter of Mr. Jones's Translation, above alluded to, the auxiliary particles (in italics) should stand detached from the word with which they there stand connected, in like manner with their English representatives *have*, *shall* or *will*, *can*, *may*, &c.; which stand also apart from *their* nominatives and verbs. In this point the idiom of the two languages is the same, except, as before stated, that the *Indian* auxiliary is *uninflected*.

"St. John i. 1,—*kéahyah* (ké ahyah) oo*gé*-wéjéwegoon (oo gé wéjéwegoon); v. 2, *káh*wéjéwegood (káh wéjéwegood; v. 3, oo*gé*-kegézhetoonun (oo gé kegé, &c.) *tahgé*oózhechegahdásenoon (tah gé óozhe, &c.) *káh*oózhechegahdáig (káh oózhe, &c.) *ké*kekáinjegámah-gáhsenoon (ké kekáin, &c.); v. 31, nin*gé*-kekánemahse (nin gé keká, &c.) *che*kekánemegood (che kekánemegood); not omitting Mr. Schoolcraft's own example (p. 178) o*gí* (o gí).

"In the event of a further translation being made of the Scriptures, it is desirable that this be particularly attended to; this appearing to be at present a very defective part in the *writing* of our translations, as well as a material obstacle to an improved orthography.

"2d. Ranging under the same denomination words that appear to belong to different classes, seems to be objectionable.

"Under this description comes perhaps the word 'aindâd (home or place of dwelling),' exemplified, p. 184, as one of an 'extensive class of *nouns*.' It appears to myself to be evidently a *verb* in the third person singular of the subordinate or subjunctive mood. Indeed, all the inflections which the example presents (viz., aindâ—*yan*,—*yun*,—*d*,—*yâng*,—*yung*,—*yaig*,—*wâd*), and also the others of which this word is *susceptible* (in which number the *negative* form may be included), are *all* exclusively *verbal*. The modifications belonging to the *noun* are utterly inadmissible, which is not the case with those substantives which are of acknowledged *verbal* origin.

"That the word is used in the sense assigned to it is readily admitted; i.e., as *definitive* of the *name*. Mr. Jones so uses it:—

St. John vii. 53...went unto his (their) *own house* { *áyindahwod* ké ezháhwug. *where they were abiding*, they went.

So also, „ xix. 27...unto *his own home* . . . . { emah *aindód*, there *where he was abiding*.

But its legitimate meaning is conveyed by a *verb* indicating the abiding (*temporarily* even, as well as lastingly), and is in this sense perhaps well exemplified in

St. John i. 38, Where *dwellest thou?* { áhn eende *aindáhyun?* what place *abidest thou at?*

„ i. 39, *Where he dwelt* . . { emah *aindód*, there *where he was abiding*.

Its *inanimate* form is *dahgoo* in the indic.; *dahgoog*, subjunct.: as,

Where *is it?* Ahn eend' *áindahgoog*? (with the *flattened* vowel).

The etymology of this word will be stated at large elsewhere in my Grammar.

"To the same (viz., 2d) observation may be referred another 'interesting class of substantives (see p. 201), derived from the third person singular of the present indicative of the verb by changing the vowel sound of the first syllable, and adding the letter *d* to that of the last.' This is, in fact, the third person of the *subjunctive*, with, as in certain *verbal* expressions is requisite, the first vowel (as Eliot terms it) *flattened*.

"What has been said above of the *modifications* of the class of words there alluded to as being *exclusively verbal*, is equally applicable to the class before us; and it may be added, that the specific terms adduced as examples (even if substantively used) can have reference to an object in the *third* person *only*, *that* being the *person*, as its derivation imports, which alone it represents. It will also be noted, as a consequence, that this term varies, in *verbal* forms, according to the *grammatical* person to which it refers.

"Thus assuming, for an example of this class of 'substantives,' this term *kákenooáhmahgaid*, we find it in the *third* person, in

St. John xiii. 13... Ye call me *Master* and Lord { kákenooáhmahg*aid* kiya óogemah ked' ezhénekáhzhim. 'he who teaches,' and 'chief,' ye name me.

In the following five places we find the same term, 'Master or Teacher,' in the *second* person:—

i. 38, iv. 31, viii. 4, ix. 2, xi. 8 } .... *Master* .... kákenooáhmahg*ayun*—i. e., '*thou* who teachest.'

xiii. 14,—Your Lord and (your) Master ..... { ked' oógemáhmewah kíya *ká*kenooáhmo*onáig*. i. e., your chief and *he* who teacheth *you*.—plu.

We find it also in the *indicative*, and *without* the altered vowel; viz.—

iii. 10,—Art *thou* a *Master* (teacher)? { *ke* kékenooáhmahg*á* nah? i. e., teachest *thou*?

In reducing an oral language, especially an American language, to a grammar plan, I find it to be of the utmost importance to have strict regard to a correct classification of terms, as essential to a true intelligible system.

"3d. Mr. Schoolcraft says (p. 195), 'A Chippeway does not say *I love*, without indicating, by an inflection of the verb, the object beloved; and thus the expression is constantly, *I love him*, or *her*, &c. Neither does the infinitive appear to be generally the ultimate form of the verb.' This embraces two important points, which, with other observations of Mr. Schoolcraft's, deserving notice, will I trust be found thoroughly investigated, and satisfactorily settled, elsewhere in my grammar, &c."—*Letter from Mr. Howse.*

"P. S.—At p. 178, l. 22–9, Mr. Schoolcraft has also printed a paragraph which I should think misprinted, if he had not repeated the errors in it in two examples. He must have been at cross purposes with his interpreter when he took the phrases in question down."

V.—*Journal of Travels in the Beylik of Tunis.* By Sir Grenville Temple, Bart. MS. pp. 244.

Sir Grenville Temple, who has just returned from a tour through Egypt and some of the states of Barbary, has kindly communicated to us a MS. journal of his excursions through the Regency of Tunis. After carefully examining the ruins of Carthage and other monuments of antiquity in the vicinity of Tunis, he visited the chief towns on the coast of the Regency; and then, proceeding from Gabes across the Sibkah el Ludiah, or *Salt Lake of the Marks*, to Nefsa, which stands on the edge of the great desert, returned to Tunis by a route across the mountains. The numberless stately remains of Roman architecture which still crown every hill and moulder in every valley of the Regency of Tunis, speak more for the energy and civilizing influence of the government of the Cæsars than the greatness of Rome itself. The following description of the remains of the amphitheatre at El Jemm, the ancient Tysdrus, will fully justify this remark—

" Within two miles of El Jemm, the ancient Tysdrus, the land is cultivated and enclosed by hedges of the prickly pear, through an avenue of which we soon after beheld the great amphitheatre towering loftily over the miserable mud hovels of the village, and appearing still more colossal from the lowness of the plain, and smallness of all surrounding objects. Having, on leaving Sfakhus, been told that the Zabataba's palace at El Jemm would be prepared for us, I had sent back the tent from Sidi Salah as an unnecessary incumbrance; this we all now extremely regretted, for the Zabataba's house, which it must be confessed is a name promising well, we found to be nothing more than *one* small room, not over-clean—and the rougher sex were, therefore, obliged to sleep with the horses in the open yard. This, and a few other inconveniences, were matters of no import to me, though they were so to those who had never travelled except in France and Italy; and they combined to form in them a very unfavourable idea of the comforts attendant on a visit into the interior regions of Africa, if we may be allowed thus to designate so short an excursion from its sea-coast. The sheikh was also, it must be confessed, excessively remiss in his duty, and threw us entirely on our own resources and capabilities of obtaining what we stood in need of. I found, however, that those who slept in the open air obtained by far a greater degree of repose than those who occupied the interior, who, tormented by fleas, were unable to obtain even the shortest period of sleep. Immediately after we had dismounted, we proceeded to view the amphitheatre, and to ascertain by inspection what other remains existed of the former *Tysdrus;* the principal of which, and indeed the only one of any consequence, we found to consist in the great extant edifice built in former ages as the spot in which the inhabitants were wont to seek for amusement. Shaw states that it dates its origin from the reign of the Gordians, who were here first recognized as chiefs—

if not by the whole, at least by a great majority—of the vast Roman empire, tired of the cruelty and despotism of Maximinus; and who for this support may have erected, as a memorial of their gratitude, this splendid monument, dedicated entirely to the amusements of their party. All this is, however, conjecture, for not the vestige of an inscription, at least that I could discover, remains to prove or contest the supposition. I entertain, nevertheless, little doubt, that if excavations were judiciously made round the spot, and the interior of the surrounding hovels were minutely examined, the stone bearing the dedication to the emperor who erected it would be discovered. Deprived, however, of the information which such an inscription would convey to us, we are compelled to satisfy ourselves with beholding an edifice which, though yielding in magnitude and splendour to the Coliseum, is still one of the most perfect, vast, and beautiful remains of former times which exists—to our knowledge, or, as I should perhaps more correctly state, to my own individual knowledge—combining in itself more of those united properties than any other building which I can at this moment bring to my recollection. The amphitheatre of Nismes I have never seen, that of Pola, in Istria, is perfect in its exterior, though completely the reverse interiorly; whilst, on the contrary, the one at Verona is diametrically the opposite, possessing the range of seats as entire as at the time when admiring citizens witnessed the sports performed in the arena for their gratification, but, with the exception of four arches, completely deprived of its exterior façade, the principal and most beautiful feature of these stupendous edifices.

"The length of the amphitheatre of *Tysdrus*, which extends nearly east and west, is 429 by 368 feet; and that of the arena, 238 by 182 feet. These two latter measurements are taken from the inner *existing* wall, the real boundary of the arena being uncertain. The height of the level of the first gallery is 33 feet, and to the summit of the edifice 96 feet.* It possesses four ranges of pillars and

* The following list may perhaps prove interesting, as showing the rank in magnitude which this amphitheatre holds among edifices of the same nature.

	Extreme Length.	Extreme Breadth.	Length of Arena.	Breadth of Arena.	Height.
Coliseum	625½	510	281	176	164
Verona	506	405	247	145	
El Jemm . . .	429	368	238	182	96
Nismes	430	338			76
Pola	416	337			
Side (Karamania)	409		125		79
Utica	363	240			
Pæstum	211	151			
Capua					
Pompeii . . .					
Syracuso	300	230	180	100	
Carthage	240	200	150	110	
Thapsus	160	113			

arches, 60 in number in each, or rather in the three lower ones, for the fourth is a pilastrade, elevated on a stylobata, with a square window in every third inter-pilaster. The capitals are of that species of the composite order which we see on Diocletian's Pillar at Alexandria, with a slight variation between the second range and those composing the first and third. At each extremity was a grand entrance, but the west one, together with an arch on each side of it, was destroyed, together with the same portion of the whole superstructure, about one hundred years ago, by Muhammed Bey, who thereby wished to prevent the possibility of the amphitheatre being converted into a strong and vast fortress by some tribes of Arabs, then in open revolt against his authority. A very small portion also of the exterior wall of the fourth or upper story remains to this day. The interior of this magnificent building is in a far more dilapidated state than the exterior, which, with the above-mentioned exceptions, may be stated to be in complete preservation; but great part of the vaulted and inclined plane, which supported the seats, the galleries, and the vomitoria, are still left. The galleries and stairs leading to the different stages were supported by arches and vaults, composed, not like the rest of the building, of large *pierres de taille*, but of a mass of small stones and mortar; and they have, consequently, in many places fallen in. Under the surface of the arena, as in those of the Coliseum and Amphitheatre of Capua, are seen passages, and little chambers for containing the wild beasts, as well as square apertures opening upon the arena, up which were raised the lions and tigers, enclosed in boxes made on the principle of the pigeon-traps used at shooting-matches, whose sides, on reaching the summit, being unsupported by the walls of the tunnel, fell to the ground, and, working on the hinges which joined them to the bottom of the box, left the ferocious monsters at once exposed to the view of the spectators.

"The key-stones of the outward arches of the lower order were intended each to have borne some figure sculptured in relief, for on one we see the bust of a female, and on the other the head of a lion; this design was, however, never completed, for on all the others we only see the projecting part of the stone which was to have assumed the shape of different figures or devices. I could discover no inscription on any part of the building, except some in Cuphic and Arabic characters; the one which doubtless existed to commemorate its founder was probably placed over the gate, since destroyed, which faced the town of *Tysdrus* to the west. This town, the foundation of whose walls can distinctly be traced, was built round the spot now occupied by the Marabet of Sidi Ahmed Bejenani, near which are the sub-structures of a very fine temple; and in different directions are seen the trifling remains of other edifices. Numerous columns of cipollino, granite, white and Numidian marble, and brescia corallata, are often discovered by the Arabs, who, cutting them into three or four blocks, send them, for the purpose of being converted into millstones, to different parts of the country. I heard that an Arab had not long ago discovered a vase, containing gold and silver coins and

engraved stones; but from the fear of their being all seized from him, he reburied it, though he has probably taken opportunities gradually, and in small portions, to dispose of its contents. Small fragments of porphyry, giallo antico, serpentino, &c. are found plentifully scattered on the surface of the ground. There is also seen a well-executed statue, in white marble, of a young Roman emperor, but the head and feet are wanting; and under one of the arches of the amphitheatre is found a draperied statue, also deprived of the head; for the Arabs, immediately on discovering any of these beautiful specimens of ancient sculpture, actuated by a religious and superstitious feeling, break off and destroy this part of the human figure."

The remarks made by Sir G. Temple, during his journey from Gabes to Tozer and Nefsa, also furnish much curious information respecting a country hitherto but little known; but as the entire Journal will shortly appear, we shall make no further extracts. We have been much gratified by the inspection of about eighty fine drawings of scenery and antiquities, with which it is illustrated.

VI.—*View of the Origin and Migrations of the Polynesian Nation; demonstrating their ancient Discovery and Progressive Settlement of the Continent of America.* By John Dunmore Lang, D.D. London, 1834, 12mo. pp. 256.

The object of this work is fully explained in its title; and the argument, apart from the observations and examples by which its several steps are illustrated, begins with proving the Polynesians to be themselves Indo-Chinese, thus:—

"I. The distinction of caste—the most ancient and remarkable feature of Asiatic society—prevails to a great extent in the South Sea islands. In Tahiti, this distinction was formerly carried to so ridiculous an extent in the case of the royal family—all the members of which were regarded as *sacred* in the highest Tahitian sense of the word—that whatever any of the princes of the blood happened to touch became sacred also. If the king entered a house, the owner had to abandon it forthwith. If he walked on a footpath, it was death for a plebeian to walk on it afterwards. In the Friendly Islands, the several castes are still better defined; and the Brahmin, or priestly caste, ranks highest, insomuch that the Grand Lama of these islands, the Tooi Tonga, as he is called, takes precedence even of the king. In New Zealand, indeed, the distinction of caste does not prevail. *There* every man is either a Rangatira, i. e. *a gentleman*, who knows no superior, and who bows to no authority; or a miserable slave, who holds, or who loses, his life at the mere caprice of his master. The slave, however, is not inferior in birth to the master. He has only become inferior through the fortune of war.

" The castes in India are,—

" 1. The Brahmin caste, whose office is to offer sacrifices, to teach the Veda, to offer gifts, and to receive presents.

" 2. The Kshutriya caste, whose office is to protect the country and the Brahmins.

" 3. The Vishya caste, whose office is to keep cattle, to carry on trade, to cultivate the land.

" 4. The Shoodra caste, whose office is to serve the Brahmins. And persons of the higher castes must not communicate with the lower in marriage, in eating, or in family friendship, on pain of degradation and the loss of all earthly connexions.

" In the Friendly Islands, in which the Polynesian system seems to have retained much more of its ancient and distinctive features than in most of the other groups, a similar, if not exactly the same, division of society obtains. In these islands the highest caste is in like manner:—

" 1. The priestly caste, the heads of which are supposed to be descended from the gods: they receive presents from the lower castes, and enjoy peculiar privileges; and the other islanders testify their respect towards them by addressing them in a sort of Sanscrit or sacred language, which is not used on inferior occasions.

" 2. The Egi, or nobles, whose office it is to preside in war, and to be the rulers of the country, the king himself being of this caste.

" 3. The Mataboolеs, or gentlemen, whose office it is to act as companions and counsellors to the nobles, to be masters of ceremonies and orators at public assemblies. The cadets or younger brothers and sons of this caste practise mechanical arts under the name of Mooas.

" 4. The Tooas, or lowest caste, consisting of common labourers, cooks, servants. And, in like manner as in India, the repugnance towards any intermingling of the castes is so strong, that if an individual of one of the higher castes has children by a wife or concubine of one of the lower, the children must be put to death to prevent the degradation of the family.

" II. The institution of Taboo, which obtains universally in the South Sea Islands, is also of Asiatic origin. Its existence and operation may be traced from the Straits of Malacca across the whole continent of Asia, through Syria, to the islands of Greece. Under the Levitical law, the shew-bread was taboo; as were the olive-trees dedicated to Minerva throughout the Athenian territory. An Athenian citizen was tried for his life before the court of the Areopagus, for removing the useless stump of one of them from his field: as would be an Otaheitan or New Zealander on a like occasion.

" III. The rite of circumcision—of decidedly Asiatic origin—is practised in several of the groups of Polynesia, as in the Fiji, Friendly, and Society Islands; not, however, as a religious observance, but as an ancient custom, of the origin of which no account can be given.

" IV. The idols of the South Sea Islanders resemble those of

Asia; especially those of the Burman empire. In both cases the idol is generally represented in a recumbent posture; its legs are disproportionately small, and its hands are clasped before it.

"V. In their physical conformation, and even general character, the natives of the South Sea Islands resemble the Malays.

"VI. Numerous Asiatic customs are still discernible in the various islands of the South Seas. In Otaheite, as in Bengal, women are not allowed to eat with their husbands, or to partake of certain articles of food which are indiscriminately eaten by their lords and masters. The general posture in sitting is that of the Asiatics—on the ground, cross-legged; and in the Friendly Islands, as in the kingdom of Siam and in other eastern countries, it is deemed most respectful to sit in the presence of the sovereign. The New Zealanders and the Friendly Islanders salute each other by touching noses—a ceremony which is not unknown in eastern Asia; and in the island of Tonga there is a game called *hico*, which consists in throwing up and in keeping in the air a number of balls, as is still practised by the Indian and Chinese jugglers.

"Nay, similar modes of thinking, and corresponding peculiarities of action, are found to prevail both in Asia and in the South Sea islands. The New Zealanders, for example, uniformly ascribe internal maladies to the anger of some Atua or divinity, who is supposed to be gnawing the patient's viscera. In such cases, therefore, instead of administering anything in the shape of medicine, the priest or soothsayer is consulted; who, after certain divinations, probably pronounces the patient given over to the anger of the god, and then taboos or excommunicates him; after which he is removed to a solitary house in the neighbourhood, and left to die, like the aged or sick Hindoo on the banks of the Ganges—no person being permitted to hold further communication with him, or to supply him with provisions. It is singular, indeed, that a similar idea, and a somewhat similar practice, in regard to the treatment of diseases, should have obtained even among the ancient Greeks. We learn from Homer, that when the Grecian army under the walls of Troy was afflicted with an epidemical disease, Machaon and Podalirius, the surgeons-general of the forces, were not asked their opinion, in the council of the chiefs, either as to its cause or to the treatment to be adopted for its cure. Chalcas, the soothsayer, was the only person consulted respecting it; and, like a genuine New Zealand Ariki, he ascribed the disease to the vengeance of the far-darting Apollo.

"In the Fiji Islands, the principal wife must be strangled at her husband's death, and buried along with him—a practice evidently borrowed from the suttees of Hindostan. The same practice obtained also in the Friendly Islands, in regard to the principal wife of the Tooi Tonga, or chief priest of these islands.

"VII. The general tradition of the South Sea Islanders—at least of those inhabiting the groups in the Southern Pacific—is, that they came from the north-west; and Bolotoo, the Paradise of the Friendly Islands, is supposed to lie in that direction.

"VIII. The cloth made in the South Sea Islands, and commonly called Otaheitan cloth, is the same, as observed by Mr. Marsden, with the original clothing of the Sumatrans; and the use of the betel-nut, as practised in the East Indies, is found to exist in several of the Polynesian isles.

"IX. A remarkable resemblance occurs between the Polynesian and Malay languages. 'One original language,' says Sir Stamford Raffles, 'seems, in a very remote period, to have pervaded the whole (Indian) Archipelago, and to have spread (perhaps with the population) towards Madagascar on the one side, and the islands in the South Sea on the other; but in the proportion that we find any of these tribes more highly advanced in the arts of civilized life than others, in nearly the same proportion do we find the language enriched by a corresponding accession of Sanscrit terms, directing us at once to the source whence civilisation flowed towards these regions.'

"'At first,' says the unfortunate La Pérouse, 'we perceived no resemblance between the language of the people of the Navigators' Islands and that of the people of the Society and Friendly Islands, the vocabularies of which we had with us; but a closer examination taught us that they spoke a dialect of the same tongue. A fact which may tend to prove this, and which confirms the opinion of the English respecting the origin of these people, is, that a young Manillese servant, who was born in the province of Tagayan, on the north of Manilla, *understood and interpreted to us most of their words*. Now it is known that the Tagayan, Talgal, and all the dialects of the Philippine Islands in general *are derived from the Malay*; and this language, more widely spread than those of the Greeks and Romans were, is common to the numerous tribes that inhabit the islands of the South Sea. To me it appears demonstrated, that these different nations are derived from Malay colonies who conquered these islands at very remote periods; and perhaps even the Chinese and Egyptians, whose antiquity is so much vaunted, are modern compared to these.'

["The following are some of the points of this resemblance:—1. All the Indo-Chinese nations, including the Malayan and Polynesian tribes, have a language of ceremony, in which their chiefs are addressed, differing, in many important particulars, from the ordinary tongue. 2. They are all monosyllabic in their structure*. 3. In all, the words are susceptible of no change denoting diversity of gender, number, and case, or what is understood in European languages by declension and conjugation. Every possible variety of thought must be expressed by a separate word; in no instance is there a change of termination. 4. Relationship is expressed in them, and compound words formed, by the mere juxtaposition of primitive words. 5. Particles are used by them in a similar way; and these particles are in many instances not merely similar, but identical. 6. Similar sounds abound in them; the consonantal are fewer and the vowel sounds

* In this statement Dr. Lang differs from Mr. Marsden.

more numerous than in the European and western Asiatic languages: (hence the facility with which they run into dialects.) 7. Various words have the same signification in them."]

Dr. Lang, now considering the Mongolian, Malay, or Indo-Chinese origin of the South Sea Islanders to be proved, proceeds next to argue on the possibility, and even *primâ facie* probability, of their having extended themselves east to the continent of America, even if there were no very considerable proof that they did, arising from similarity of habits or manners. The usual objection arises from the distance, by sea too, and against the general course of the trade-winds. But the Malayans were always maritime in their habits; their descendants (the South Sea Islanders) are known to resemble them in this. Thus, it seems demonstrated, they actually have reached even the most remote Polynesian islands; and the prevalence of cannibalism in these may be considered an evidence of the distress to which individuals were frequently reduced during their progress. Is there any abstract difficulty, then, in supposing that they went farther? or, rather, is not the mind, on these considerations, prepared to admit the following coincidences as proofs that they did?

"I. The Mexican and Peruvian nations were divided into king, nobles, and commons. The king was absolute, but could not go to war or engage in any other undertaking of importance without the assent of a council of chiefs. The chiefs were lords paramount in their own territories. The commons were mere slaves, whose persons and possessions were entirely the property of their masters. A precisely similar distribution of the component parts of society, and a precisely similar state of dependence of the king on the will of the chiefs, are observable in the Friendly and Society Islands.

"II. The Incas, or sovereigns, of Peru conjoined the regal and sacerdotal offices, agreeably to the ancient and patriarchal usage, *Rex Anius—rex idem, idemque sacerdos*. They were regarded, moreover, as divine personages—sprung from the gods. Such, however, was also the status of the Tooi Tonga, or royal priest, of the Friendly Islands; and the idea that the royal chiefs were Atuas, or divinities, was universally prevalent in the islands, and was sufficiently evinced in the received opinion, or rather doctrine, that the king consecrated whatever he touched.

"III. There was a language of ceremony or deference used in ancient Mexico when inferiors addressed their superiors, and especially when a plebeian addressed a chief, or when the latter addressed his prince. This language did not consist in the use of a few phrases of deference and respect, such as those in use in European languages in addressing royalty or nobility: it constituted, so to speak, a separate language, and pervaded the whole economy of speech. 'The Mexicans,' says Dr. Robertson, 'had not only reverential nouns, but reverential verbs;' and the use of any other

than this reverential language, in conversing with a king or royal chief, would have been held tantamount to high treason. The prevalence of this most remarkable peculiarity in the South Sea Islands, among the Malays of the Indian Archipelago, and the Indo-Chinese nations of Eastern Asia, has been already noticed; and how deeply rooted in the mental constitution of these nations, how closely interwoven with all their habits of thought, was the principle in which this very singular practice originated, may be estimated from a practice of a somewhat similar kind that obtained within these few years in the South Sea Islands. It was a point of established etiquette in the island of Otaheite, that if any word of common use in the language happened to form part of the king's name, it was no longer allowable to use that word thereafter in common conversation; and the object it had designated from time immemorial had thenceforth to be designated by a totally different word. Thus, the word *vai*, signifying *water*, being honoured some time ago in being associated with the name of Tahitian royalty, was thenceforth proscribed in common conversation, and its place supplied by the word *puppi*. The word *po*, signifying *night*, was equally unfortunate as a word of general use in the language, in consequence of being appropriated as part and parcel of the name Pomarre—a name which, although rather famous for the last twenty years in the Missionary annals of the South Seas, signifies merely *night-cough*, and was given to Pomarre in consequence of his being troubled on one occasion with an affection of that kind.

"IV. The right of property was recognised and established among the Indo-American nations, but the lower orders generally cultivated a considerable extent of ground in common, the produce of which was laid up by their superiors in storehouses called *tambos*, and distributed to each as he had need. The kumaras, or sweet potatoes of New Zealand, are always cultivated *pro bono publico* by persons set apart for the purpose, the produce being afterwards distributed. The storehouses in New Zealand are *taboo:* I suspect the Spaniards have reported the word inaccurately, for the Mexican *tambo* is probably the same word as the Polynesian *taboo*.

"V. A variety of handicrafts were practised in Mexico; and the Spaniards were often astonished not only at the perseverance of the Indians, but at the neatness of their work compared with the rudeness of their implements. Similar remarks have been made a thousand times in regard to the South Sea Islanders.

"VI. The Mexicans are remarkably fond of ornaments; and they form some of those that are most highly prized in a precisely similar way.

"VII. The Peruvians cultivated the ground with a mattock of hard wood. So also do the New Zealanders. The Mexicans, Humboldt informs us, manufactured a sort of paper exactly similar in texture to the paper-cloth of Otaheite.

"VIII. The Indo-American nations had no temples properly so called, i. e. buildings for religious purposes having a roof; but they

erected solid mounds of earth, which were ascended by a flight of stone steps, and surmounted with a sort of altar. Similar *high places* are erected in the South Sea Islands, and are called *Morais* or *Malais*.

"IX. The divinities that were worshipped by the Mexicans were supposed to require human victims to be offered in sacrifice on their altars; and such victims were accordingly offered, to the number of several thousands annually." The same horrible superstition prevailed in Otaheite, where the dead body of the human victim, who had perhaps been designated by the priest, and knocked on the head without any previous warning by one of his emissaries, was suspended in a basket of wicker-work to the branch of a tree near the *Morai* of the god, and left to putrefy in the open air.

"X. The houses of the Mexicans had no windows, and the door was always so low that they had to stoop down on crossing the threshold. The New Zealander constructs his hut in a precisely similar way.

"XI. Remains of ancient buildings in a singularly massive style of architecture are found in various parts of the continent of America—to the northward as well as to the southward of the equator. These remains consist,—first, of temples; second, of pyramids; third, of tumuli; and fourth, of fortifications: and it is a circumstance worthy of particular observation, that precisely similar remains, of a remote and comparatively civilized antiquity, are found in the South Sea Islands.

"1. The Spanish writers on South America describe the remains of an ancient Peruvian temple, consisting of an inclosed space open at the top, of which the walls are about twelve feet in height and consist of stones of an immense size, some of them being thirty feet long, eighteen broad, and six thick. These stones are not cemented with mortar; neither have they been squared to join closely to each other, like hewn stones in a European building, although the stones of ancient Peruvian buildings are sometimes found hewn into regular forms; but cavities have been wrought with the utmost exactness, and with incredible labour, in one stone to receive the natural or accidental protuberances of another.

"2. Baron Humboldt has described various ancient Peruvian pyramids, which, for the massiveness of their structure and the boldness of their design, that accomplished traveller does not hesitate to compare with the pyramids of Egypt."....."In speaking of structures of a precisely similar kind erected by the South Sea Islanders, Mr. Ellis observes, 'The form of the interior or area of their temples was frequently that of a square or parallelogram, the sides of which extended forty or fifty feet. Two sides of this space were inclosed by a high stone wall; the front was protected by a low fence; and opposite, a solid pyramidal structure was raised, in front of which the images were kept and the altars fixed. These piles were often immense. That which formed one side of the square of the large temple in Atehuru, according to Mr. Wilson,

by whom it was visited when in a state of preservation, was two hundred and seventy feet long, ninety-four wide at the base, and fifty feet high, being at the summit one hundred and eighty long, and six wide. A flight of steps led to its summit; the bottom step was six feet high. The outer stones of the pyramid, composed of coral and basalt, were laid with great care, and hewn or squared with immense labour, especially the *tiavă*, or corner stones.'

"3. Tumuli, constructed, in some instances, of immense stones, and in others, as on the banks of the Ohio, of mounds of earth, are also found among the remains of ancient civilisation, both in the South Sea Islands and in America. The island of Tonga Taboo, which contains a population of ten thousand souls, is of coral formation, and is almost level with the ocean. There is a tomb, however, in one part of it of great antiquity, called by the natives the tomb of Toobo Tooi, and constructed of immense stones, such as the present natives of Tonga, in the existing state of the mechanical arts in the Friendly Islands, would be utterly unable to move. These stones, moreover, must have been brought on rafts from some other island, as there is no other stone in the island of Tonga of the size of a pigeon's egg. Remains of ancient buildings, in a similar style of architecture, were found by Lord Anson in the island of Tinian, to the eastward of the Indian Archipelago.

"Remains of a similar character are found also in Pasquas, or Easter Island, situated in lat. 27° south, and 109° west long.—the nearest of all the South Sea Islands to the continent of America. 'The most remarkable objects in Easter Island,' says Mr. Ellis, 'are its monuments of stone-work and sculpture, which, though rude and imperfect, are superior to any found among the more numerous and civilized tribes inhabiting the South Sea Islands. These monuments consist in a number of terraces or platforms built with stones, cut and fixed with great exactness and skill, forming, though destitute of cement, a strong durable pile. On these terraces are fixed colossal figures or busts. They appear to be monuments erected in memory of ancient kings or chiefs, as each bust or column had a distinct name. One of these, of which Forster took the dimensions, consisted of a single stone twenty feet high and five wide, and represented a human figure to the waist; on the crown of the head a stone of cylindrical shape was placed erect: this stone was of a different colour from the rest of the figure, which appeared to be formed of a kind of cellular lava. In one place, seven of these statues or busts stood together: one, which they saw lying on the ground, was twenty-seven feet long, and nine in diameter.'

"4. Remains of ancient and regular fortifications have also been discovered in both continents of America; and the circumstance has repeatedly awakened much curiosity respecting the origin, the history, and the fate of the nation that has left behind it these memorials of its ancient civilization. But regular fortifications of a similar kind are still met with in all parts of the South Sea Islands. In some islands they are constructed of walls of loose stones piled on each other on

the tops of hills, as in New Zealand; in others, they are formed of strong palisades, like the Burman stockades, as in the level island of Tonga; and in others they consist of some artificial addition to a place of great natural strength, as in the district of Atehuru in Otaheite.

"XII. The picture-writing of the ancient Mexicans has also a decidedly Polynesian, Malayan, or Chinese aspect; and examples very similar to it occur among the South Sea Islands. 'In the course of our tour around Hawaii,' says the Rev. Mr. Ellis, in an Appendix to his valuable work entitled Polynesian Researches, 'we met with a few specimens of what may perhaps be termed the first efforts of an uncivilized people towards the construction of a language of symbols. Along the southern coast, both on the east and west sides, we frequently saw a number of straight lines, semicircles, or concentric rings, with some rude imitations of the human figure, cut or carved in the compact rocks of lava. They did not appear to have been cut with an iron instrument, but with a stone hatchet, or a stone less frangible than the rock on which they were pourtrayed. On inquiry, we found that they had been made by former travellers, from a motive similar to that which induces a person to carve his initials on a stone or tree, or a traveller to record his name in an album,—to inform his successors that he has been there. When there were a number of concentric circles with a dot or mark in the centre, the dot signified a man, and the number of rings denoted the number of the party which had circum-ambulated the island. When there was a ring, and a number of marks, it denoted the same; the number of marks showing of how many the party consisted; and the ring, that they had travelled completely round the island: but when there was only a semicircle, it denoted that they had returned after reaching the place where it was made. In some of the islands we have seen the outline of a fish pourtrayed in the same manner, to denote that one of that species or size had been taken near the spot: sometimes the dimensions of an exceedingly large fruit, &c., are marked in the same way.'

"XIII. Notwithstanding the comparatively high degree of civilization, which the ancient Mexicans had attained, previous to the discovery of the American continent by Europeans, their wars were uniformly conducted with the most savage ferocity, and their captives were generally put to death and devoured. Indeed, a degree of ferocity altogether unexampled in the annals of European warfare, either in ancient or in modern times, seems to have distinguished the Indo-American nation in almost all its settlements, and in every period of its history; and the horrible practice of cannibalism appears to have prevailed to an enormous extent among its various tribes. Philosophers of high character have recently expressed their utter astonishment at the prevalence of so revolting a practice in that particular division of the human family; but, allowing the present hypothesis to be well-founded, the first inhabitants of the American continent must, from the very nature of things, have been ferocious cannibals when they landed on its shores: cannibalism must have been the general

practice of their forefathers of the Polynesian nation, in the course of those miserable voyages that led to the successive discovery and settlement of the myriads of islands that stud the bosom of the Pacific, and are separated from each other, in many instances, by extensive tracts of ocean; and the horrible practice thus introduced by necessity, and divested of its horrors by general usage, may afterwards have been indulged in from custom, if not choice.

"XIV. The great councils of the Indo-American nations, in which affairs of public interest were publicly discussed, were conducted in the same manner as those of the Polynesian nation. Youth was not suffered to mingle in the high debate. Regular harangues were delivered; most of which were highly animated, and some highly eloquent. And when any speaker had possession of the assembly, he was listened to with profound attention.

"XV. Even in their prejudices and slight conventional points of manners, a resemblance may be traced between the Indo-American and Polynesian tribes. They both impute disease to the agency of evil spirits. Their modes of interment are similar, both suspending the body at some distance from the ground, where it is left to putrefy; and afterwards collecting the bones, and placing them in a common cemetery. Both consider revenge a sacred duty; both steal on their intended victim; and each after his manner regards the head as his trophy, the Indian scalping it, and making a drinking cup of the skull, the Polynesian baking it in an oven, and preserving it for generations. Both separate from their women when nursing, and forbid them, under pain of death, to touch, at that time, with their hands even the food they themselves eat. The South Sea Islanders prepare an intoxicating beverage from the root of a sort of wild pepper which they call *cava;* the Indo-Brazilians and aborigines of Guiana prepare another from the American plant which they call *cassara;* and both prepare their beverage in nearly the same disgusting manner. Both catch fish by poisoning their waters with narcotic plants. Both, in reckoning their descents, attach peculiar importance to the mother's family. Both set a high store by the virtues of hospitality. The Indo-Americans, on the authority of Captain Basil Hall, resemble the Malays in feature and colour. And even their languages are not without features of similarity."

Dr. Lang next traces these at considerable length, and with some desultoriness. We can neither quote this part of his work, however, nor satisfactorily abridge it. We think that he has established his main point; and, moreover, that he has brought within a moderate compass a great many curious facts and coincidences. We wish that he had, at the same time, expressed himself on some occasions with more deference for previous writers.

VII.—*Journal of a Three Years' Residence in Abyssinia, in furtherance of the Objects of the Church Missionary Society.* By the Rev. Samuel Gobat. London; 1834. 12mo. pp. 371.

THIS work is another contribution by the Missionary Societies to our knowledge of the social condition of distant countries; and although it contains no numerical statements, and little besides to the purpose of the mere geographer, yet our intercourse with Abyssinia is too limited to allow us to pass it without some remark. It is the moral aspect of the country which has chiefly attracted Mr. Gobat's notice; and though still a painful subject of contemplation, it is somewhat less so in his hands than in those of his predecessors. The general outline of restlessness and sensuality remains untouched; but with it he seems to have found mixed up much patience under rebuke and expostulation,—much individual gentleness of character,—and, above all, perhaps, much curiosity regarding the opinions of others, and respect, in particular, for those of the missionaries. This last, it is true, seems to have been evidenced in Mr. Gobat's case, chiefly by engaging him in theological discussions, and courting his decision on nice points of faith and opinion; but its effects would not be confined to these, if scope were afforded to its more extended influence.

It is a curious question in anthropology, whence arise the comparative gentleness and tolerance usually, though not universally, found among Pagans and Christians, who occupy the extremes in social existence; and the fierce intolerance of the followers of Mahomet, who may be considered as standing between both. The answer is not immediately obvious; nor could it be considered adequate unless it met, and in some degree reconciled, even the apparent exceptions to the observation. But it would be an important contribution to anthropography, and by so much to geography, if it accomplished this task.

The curse of Abyssinia seems to be its weak and unsettled government; and the following passage so strikingly illustrates this, that it may be considered an essential preliminary to Mr. Gobat's further statements regarding the character and manners of its inhabitants.

"At the time of Mr. Bruce, the kings were possessed of a little power, and, at the time of Mr. Salt, they yet had some appearance of it; but since the death of the Ras Googsa, about ten years since, they have had nothing but the title of king. They would have lost even this, were it not that the governors stand in need of it, to support that of Ras; for a dejasmat cannot take the title of Ras, lawfully, unless he has placed a new king on the throne.

"At the time of Mr. Salt, the reigning king was Gooaloo, who reigned seventeen years; and after him, Joas, for four years. Then the dejasmat of Semen, Heila Mariam, placed Beda Mariam upon the

throne; but he could not sustain him. He reigned only three or four days; being displaced by Eemam; and succeeded by Guigar, who had the title of king eight years. After the death of Mariam, Guigar was dethroned; and succeeded by another Joas, who, one year after, was obliged to cede the throne to Guebra Christos; and he, it is said, died in consequence of poison being administered to him by order of the old king, Guebra. I do not know whether there be at present a king or not. The imprisonment of the male members of the royal family, of which Mr. Bruce speaks in detail, is no longer considered as necessary. All the members of that family are dispersed in the various provinces, and live partly on what the grandees are pleased to give them, and partly by their own industry. They are, however, generally beloved and esteemed by the people, who, being incapable of forming to themselves any higher idea, have no other hope for the future than to see this royal family restored, and to enjoy the fruits of such a restoration.

"The most important men, who have governed the interior since the time of Mr. Salt, are, the Ras Googsa, whose death is still regretted, on account of his justice and peaceable disposition; and his three sons—Eemam, beloved, like his father, of the whole nation, and who governed three years; Mariam, hated by all, except his soldiers, who governed three years; and Dori, who governed only three months. The present governor is the grandson of Googsa, by a daughter; who has assumed the title of Ras Ali, and with whom the people are much satisfied. The Dejasmat Maroo, son-in-law to Googsa, during some years goverued, with mingled justice and cruelty, the provinces of Dembea, Kovara, and Agow; but his only son has not been able to succeed him. The Ras of the family of Googsa has given the government of Dembea and Kovara to his nephew, the Dejasmat Comfoo, whom I saw at Gondar. In Samen, the Ras Gabriel governed at the time of Mr. Salt. His son and successor, Hula Mariam, is still regretted throughout Abyssinia, and especially by the people whom he governed. It is seven years since he died; and his son Oubea succeeded him without difficulty, and has kept Walcaït, which his father had subdued. For the last forty years there has been, comparatively, but little war on the other side of the Tacazze; and the country has been miserable only during the three years of Mariam's government. Tigré, on the contrary, has been in a state of trouble and anarchy ever since the death of the Ras Walda Selasse, in 1815 or 1816, excepting during the seven or eight years of the government of Sebagadis.

"Shoa is entirely separated from the rest of Abyssinia, in all its agitations. The actual king, Sehla Selasse, the seventh of the same family, aged thirty-three years, has already reigned eighteen years, to the satisfaction of his people, who are very proud of him. During the last few years he has much extended the frontier of his kingdom to the south and the west. The provinces of the Gallas which he has subdued have generally embraced the Christianity of Abyssinia."

Mr. Gobat did not penetrate to this last favoured portion of the country; but experienced the full inconvenience attending the

dissensions in the remainder. His residence was chiefly in Adowah (the capital of Tigré) and Gondar, to which he penetrated by a new road, making thus a small addition to our previous itineraries of the country. The chiefs of both cities were his friends; but just before his departure one of them defeated the other, and beheaded him; and almost the concluding portion of the narrative records the moderation of the victor, in granting about half the father's dominions to his family.

With these brief notices of modern Abyssinian history, we proceed now to extract the most important statements which we elsewhere find in Mr. Gobat's volume, regarding the political institutions,—religious divisions,—and moral state of the country.

I. "The independent governors are absolute in every respect; it is, therefore, difficult to say anything of their politics. They are at liberty to give the government of a district to, or to take it from, their inferiors, according to their pleasure: they generally find, however, that it is their interest to support the hereditary system, in the government of various districts. The Abyssinian governors have never, up to this time, thought of introducing the least amelioration into their country; with the exception of Sebagadis, who did not know how to begin it. Their chief object is to aggrandize themselves, without thinking what may become of their children after them. When they see themselves near their end, they endeavour to transmit their authority to one of their children, the son of their favourite wife; but he, being in general younger, and having less experience than his brothers, scarcely ever succeeds.

"Jurisprudence is very simple in Abyssinia. There are no advocates (lawyers). If any one has a complaint against another, he will rise before day-break, in order to go and cry before the house of the governor of his district, till he hears him. Then the accused person is summoned, who has a right to defend himself. The accuser and the accused put questions to each other alternately. The judge hears their reasons; summons the witnesses, if there are any; and, after the report of two or more, or, for want of witnesses, after taking an oath from the accused, he decides. In order to prevent noise, the judge orders both parties to speak separately, and appoints a pecuniary fine to be paid by him who interrupts the speech of his adversary; and thus he keeps a kind of order. If one of them should utter serious things or falsehoods, the other asks, by signs, permission to speak; and the judge, giving it, imposes silence upon the first. The sub-governors being easily corrupted by bribes, all the important cases are presented to the governor-general, or *Dejasmat*, who usually gives himself much trouble to discover the truth; and then he frequently summons a learned man, with their code of civil laws, called *Fetha-Negest*, the origin of which they attribute to Constantine. He often decides the punishment according to that rigorous code. The dejasmats, however, are at liberty to decide arbitrarily, in all cases: they frequently mitigate the punishment prescribed by the Fetha-Negest: in general, they are much less severe than the

kings were, when they had power. A thief, for instance, was flogged for a first offence; for a second, he had his right hand cut off; for the third, he was killed: but now they flog him several times, before they cut off his limbs or kill him. No judge has the power to decide the fate of a murderer (except the person killed be a stranger, when the dejasmat considers himself as related to him): this is left to the will of the relations of the person whom he has killed; the judge having only a right to propose a ransom instead of death, and to exhort the relations to accept it; but he may not compel. The price for a man is two hundred and fifty dollars. When a man kills one of his own relations there is no punishment for him. They never pass the Tacazze, from either side, to pursue a murderer. When the relations of a murdered man are not known, as is the case in war, the priests take, in some way, the place of the avenger of blood, by refusing the sacrament to a murderer until he pays the price of blood, or two hundred and fifty dollars to the church.

"Formerly, all important cases were brought before the king and his twelve *leecs*. (The leecs composed a kind of ministry, being both chosen and dismissed by the king, who, in his turn, could do nothing without them.) They alone had the right to judge in criminal matters; but at present they preserve nothing but the title, and the right to judge, in some particular cases, at Gondar only."

II. "The religions of Abyssinia are Christianity, Islamism, and Judaism; to which may be added two separate people—the Camaountes and the Zalâne."

The Christians of Abyssinia are deeply sunk in superstition, and much given to theological discussion. They are divided into three parties, so inimical to each other that they will not take the sacrament together:—the points of division being the nature, extent, and incidences connected with the union of the divine and human natures in the person of the Saviour. They baptize their male children after forty days, and their female after eighty; believing that these periods mark the periods when Adam and Eve respectively received the Holy Spirit. They do not baptize with water only, but with a *merom*, as the Greeks. After baptism, an infant has a new dress put on, and receives also the communion. Marriages are performed with great simplicity, and are as easily dissolved; but after a third divorce, men can neither contract another regular marriage, nor receive the sacrament, unless they become monks. In such cases, accordingly, they usually reconcile themselves to one of their previous wives. The Abyssinian Christians do not believe in a separate purgatory, but conceive that the souls of all men go to hell, from which those that are to be saved are specially delivered by the Archangel Michael. They attach great importance to fasting; and have preserved many Jewish customs, as circumcision, ceremonial uncleannesses, abstaining from forbidden meats, &c.

"The Mahomedans appear to have multiplied in Abyssinia since the time of Bruce. The places where they are in greatest number are Adowah and its vicinity; Hawasa, and the vicinity of the mountain Toloca in Samen, where the Jews were formerly independent; Derecta, in the province of Begameder; and Gondar. They live pretty well with the Christians; but it is only by their hypocrisy that they support each other, among themselves. They have sometimes friends of their own creed; but wherever friendship requires confidence, they seek it among the Christians. They have no greater subject of discontent than to see themselves placed under a Mussulman; although they will greatly rejoice when they hear that a man of their creed is in authority in another country. The Mussulmans have seldom vast districts to govern, but have almost all the custom-houses; for they use the merchants very ill, in order to give more presents to the Dejasmats than the Christian customers, who are more conscientious, can do. They generally engage much more in trade than the Christians; therefore they have more money. They alone have the traffic of slaves, the Christians never taking any part in it. There is nothing to say of their religion itself, for there are very few possessing the least knowledge of the Korân; and, provided they feed and clothe their sheiks or focaras, these do not care about teaching them anything else than some favourite expressions of the Korân, to flatter themselves in condemning others; but all of them are very zealous to make proselytes. When the Mussulmans of Abyssinia go to foreign countries, they learn to pray; and pray regularly five times a day, and observe the fast of Ramadan much more strictly than the Arabs: but after their return to their own country, they generally forget their prayers, and do not care much for the Ramadan. Like the Christians and Jews, the Mussulmans of Abyssinia never eat the meat of an animal not killed by a man of their own sect. In morality, they are in every respect inferior to the Christians.

"The Falashas or Jews live so retired, and are so separated from the Christians, that the latter know scarcely anything either of their doctrines or of their manners. They live chiefly in the neighbourhood of Gondar and Shelga, and to the north-west of the Lake Tsana. I have done all I could to procure information concerning them; but have been able to ascertain one thing only; viz. that they are much more ignorant than the Christians. Those whom I have seen always used to send me to one of their learned men, when I proposed any question to them. They do not know of what tribe they are; nor have they any adequate idea as to the period when their ancestors settled in Abyssinia. Some say that it was with Menilec, the son of Solomon: others believe that they settled in Abyssinia after the destruction of Jerusalem by the Romans. They have, on the whole, the same superstitions as the Christians: they are only a little modified, after a Jewish fashion. I have never observed that they took the least interest in the idea of the Messiah; and when I examined them on this subject, they coldly replied, that they expected him in the character of a great conqueror, called Theodoros, who must soon

appear, and whom the Christians also expect; but the poor Falashas do not know whether he will be a Christian or a Jew. What they have in common with other Jews is, hatred to Christ. They have a dialect among themselves, which has no similarity either with the Hebrew, or with the Ethiopic; but all of them, except some females, speak Amharic. I have seen but one book in the Falasha dialect, written in the Ethiopic character: they told me that it was a book of prayers. In fact, they must be very ignorant, having no books except in the Ethiopic language, and being surrounded with innumerable difficulties, which prevent them from learning that language. I have, however, seen some individuals who know pretty well the contents of the Books of Moses. They read the Psalms, with all the repetitions of 'In the name of the Father, the Son,' &c. which the Christians have added to them, as well as the Songs of Mary and Simeon; but they do not join to them the Oodassé Mariam of Ephrem. They are much more laborious than the other Abyssinians: the building of all the houses of Gondar is their work. They do not allow the Christians to enter their houses, except by force; nor do the latter desire to enter them, for fear of their supernatural influence. All of them are considered as boudas or sorcerers, as also are the artificers in iron and many others. The Falashas, after having spoken with Christians, never enter their own houses without first washing their bodies and changing their dress. All the provisions they buy in the market are washed by them before they make use of them. Their intercourse with the Mahomedans is a little more free than with the Christians. They never carry arms, either for attack or defence. They maintain their own poor, and will not suffer them to beg.

"The Camaountes are a people few in number, inhabiting the mountains about Gondar. Their principal occupation is agriculture; but the women, with immense brass ear-rings, and their ears hanging down to their shoulders, furnish the market of Gondar with wood. I have not been able to go to their villages, finding nobody who would accompany me. I have seen some of them in my house, but could not learn anything of their religion. I believe them to be Deists, satisfied with the idea of the existence of one God, without thinking of the relations He sustains to man—much like the Deists in Europe; and therefore not to be trusted. When they are asked questions in general, and especially with regard to their religion, they always answer in an equivocal manner and in the tone of a buffoon. They nevertheless have a species of priests, and assemble themselves in their own private houses, where they have a repast, which they call 'corban,' communion or eucharist. They are afraid of sorcerers too, but they are not considered as such. They eat meat with the Christians and Mahomedans, provided the animal has not been killed on a Saturday; but they never eat fish.

"The Zalânes are a migratory people, wandering about, with their herds, in the fertile but uncultivated environs of the Lake Tsana, or the Lake Dembea. I have seen but three or four of them: all were very tall, and robust. They are said to believe in the existence of

one God, but to have no other religion. I am inclined to suppose that ignorance has prevailed among them to such a degree as to separate them from the Christians entirely, though their ancestors may have been Christians, which the other Abyssinians will not admit. They do not fight, except for the purpose of defending themselves; and this they do with large sticks, which they handle so skilfully, that no one dares to attack them, either with the lance or the sword."

"III. The principal cause of the corruption of manners in Abyssinia is, after their mental errors, their unsettled mode of living. A Governor, for instance, does not like to remain long at the same place, even when there is no war. He resides sometimes at one end of the province which he governs, and sometimes at the other, with a great number of officers and servants. His first wife is frequently obliged to remain in the house to which he has taken her; and he, not willing to live alone, takes a concubine. Thus the first sin being committed, he continues to add others to the number, until he has lost every feeling of conjugal duty. Those who are with him are in the same situation, and do the same things. Several women being in this manner attached to one man, who is not their husband, and seeing themselves neglected, endeavour on their part to corrupt young men, whose situation should maintain them in innocence; and thus immorality is communicated to all the branches of society. Nevertheless, openly they maintain much more decency than one would be led to suppose, after having read the description which Bruce gives of an Abyssinian feast. I admit that such a feast may have taken place among the most shameless libertines; but excesses of that kind are not customary, either as to their cruelty or their indecency. I have heard people speak of many things; but I have seen less indecency in the capital of Abyssinia than in the capitals of England, France, and Egypt. In Tigré, with the exception of Adowah and Antalo, the women are much more reserved than in the interior. The ordinary consequence of the immoralities alluded to is sloth: from which results poverty, together with the desire to live, where pride is not offended, in a state of dependence on others: the result of which, again, is envy, craftiness, and falsehood. The Abyssinians are liars, as well as the Arabs; but they have yet a feeling of shame when discovered, which the Arabs have not. The first consequence of falsehood is swearing. Another series of vices, which also result from illicit connexions (for so I call the polygamy of the Abyssinians, as they know very well that it is unlawful), is to be found in the circumstance, that the children of one and the same father, who are not of the same mother, are always enemies to each other, in such a degree, that they cannot endure to see one another; nor have they any feeling of filial love for their father, inasmuch as he generally has a fatherly affection only for the children born of a favourite wife: not to mention their jealousies, and the consequences thereof; which go so far, that an adulterer is often killed by his rival. This inconstancy in the intercourse of the sexes with each other may be observed during the whole life of a man. It is this that renders the Abyssinians so light-

minded, having nothing constant but inconstancy itself; although the children show less of levity than the children of other countries.

"It affords me great satisfaction to be able to remark—but almost solely with reference to the Christians—that in the midst of the chaos of corruption in this country there are some traces of goodness, which, like precious stones, have remained dispersed among the moral ruins of Abyssinia. A traveller, for instance, is never at a loss to find a lodging; when he arrives in the evening at a village, he seldom needs to ask for a lodging, the first person who sees him invites him to lodge at his house, where he may be as much at his ease as if at home, and assured that, were he laden with gold, his host would not touch the least thing. The Abyssinian traveller, on his part, unwilling to impose on the kindness of his host, spares his own provisions only when he is, as it were, forced to do so. I do not speak here of villages on those roads which are much frequented by caravans, and where the people learn too easily the colder manners of strangers. Formerly the Abyssinians had much respect and attachment for the White people, and in the interior this is the case still; but in Tigré, White people are often despised. The reason of this is, that the people of Tigré see much more of the White people than those in the interior; and have but too many occasions to observe, that in point of morals they are not superior to themselves, when they are in the same circumstances. Nevertheless, even in Tigré, I have never wanted a lodging when I have arrived in the evening: the people of the village frequently brought the best things they had, for the supper of myself and servants.

"I have mentioned elsewhere, that the Abyssinians are robbers; but, with the exception of the neighbourhood of the Shohos, where I then was, they are robbers only in one sense. This is in times of anarchy, when every chief of a district assumes independence, with the intention of bringing the neighbouring districts under his power; for which object he wants money, which he can only obtain by giving to his subjects liberty to pillage the strangers, and, if they can, the neighbouring districts. They look upon pillage, in this sense, as a right of war; and it is in this respect that all of them are robbers. The interference of a governor or dejasmat prevents all this. There are many who endeavour to cheat in the market; but because thieves are punished severely, general disgrace is connected with stealing, which therefore is, comparatively, seldom committed; and it is generally easy to get the stolen articles back again. Once, for instance, I was in the camp of Walda Michael, when a man complained that he had been robbed, without his knowing the thief. Immediately after, a priest was sent for, in order to pronounce an anathema upon the thief; who, at the end of a quarter of an hour, sent the stolen article back, without making himself known. Thus they can nearly always effect the return of stolen articles; but in this case they do not inquire for the thief, lest the fear of punishment should render the anathema without effect. The servants are generally more faithful than in Europe. Even a thief by profession would not rob his master's

house; and should this very rare case happen, the servant would put himself in such a situation as never to be met with again by his master. If there are any exceptions, they are that the female servants take small things secretly to eat. The Abyssinians punish their children severely only when they have stolen. I have seen a mother, usually of a very meek temper, and who would not see a man cause suffering to the smallest reptile, burn the skin off both the hands and lips of her daughter, only nine years of age, for having put her finger into a mug of honey.

"Though I have heard of some acts of cruelty, still I must say, that in general the Abyssinians are not cruel. In war they scarcely ever kill a man whom they take prisoner; and when they see that victory is theirs, they prefer making great circuits in order to take prisoners, rather than killing those who still defend themselves before them. The cases in which they are cruel occur in the wounded of the opposite party; they let them languish, and miserably perish, when a little care would probably save their lives. Nor are they cruel to animals; and therefore I can scarcely believe what Bruce says concerning their cruelty in this respect: and whenever I have asked the Abyssinians whether it happens sometimes that people cut off a piece of flesh from a living animal to eat it, they have always manifested horror at it. But having myself experienced what extreme hunger is, I believe the possibility of any act a man is capable of devising, in order to procure necessary food. If there are cases of cruelty, such as Bruce reports, they certainly are exceptions; and particular cases of that kind are not wanting in Europe. I have seen parents chastise their children for having plucked out feathers from a fowl which was not dead, although they were going to kill it.

"Toward the poor the Abyssinians are very charitable. Their motives may not always be the purest; but God only knows these thoroughly, it belongs not to me to judge. When at Gondar, in the time of dearth, I have known persons of fortune who entertained about sixty maimed persons; and, in fact, when the Abyssinians have it in their power, they never send a beggar away without giving him something; they sometimes give beyond their means, for they will frequently suffer hunger in order to share the little they have with those who are still more miserable. In good seasons, therefore, there are but few beggars. The beggars almost always ask alms in the name of the saint of the day; and, having eighteen festivals, or days of idleness, every month, there is always some variety.

"The Abyssinians are very easily provoked to anger; but they are as easily reconciled to each other. In Tigré, they sometimes beat each other in their disputes; but in the country of Amhara this scarcely ever takes place, for there the man who has beaten must pay a fine, proportionate partly to the offence and partly to his means; half of which is for him who has been beaten, unless he has also struck, in which case both are fined. Sometimes they are seen to insult each other in such a manner that one would expect they would never be reconciled again, and yet at the end of a quarter of

an hour, they are often good friends again. Excepting the petty governors, who are jealous of the advantages of their equals, and of those who are a little superior to them, there are scarcely any who keep up implacable hatred. The grandees pardon their inferiors easily when they ask for pardon. For the reconciliation of two parties, there must always be a mediator; sometimes it is one of the parties that request him to exercise his function; this is the case particularly when discords between husband and wife are to be settled. After having arranged between themselves, one of them, generally the most culpable, puts a large stone upon his neck, and, approaching the other, asks for pardon: the other, in saying to him 'May God forgive you!' takes the stone and puts it on his own neck, in order to ask pardon of the first; who, on forgiving him, takes the stone and puts it again in its place. A master, however, seldom puts the stone on his own neck; he contents himself, on forgiving his servant, with taking the stone from his neck and putting it into his hands. They carry also a stone to an offended person, even if no dispute has taken place. One day, two of my servants, after having sought in vain, till ten o'clock in the evening, for a sheep they had lost, came to me, creeping on their hands and knees, each with a stone of about eighty pounds weight on his neck, to request me to beat them severely, as a proof that I forgave them, as a father forgives his children after having chastised them. The stone they carry is generally a mill-stone. The rarest thing in Abyssinia is for the relatives of a man who has been killed to forgive the murderer; and when they do not agree upon a pecuniary fine, they make use of the same arms with which he has killed their relative to kill him: so that if he had killed a man with his hands, they would kill him with their hands also."

We are happy to find that Mr. Gobat bears honourable testimony to the character left by Mr. Bruce in Abyssinia: many other things we leave behind to reward those who will examine for themselves a moderately-sized volume, regarding an interesting country, from the entry of the missionaries into which we may reasonably augur that, at no distant period, its population will become both more intelligent and better known. A valuable contribution to the Physical Geography at least of its Northern Provinces may, we believe, be shortly expected from Dr. Ruppell.

VIII.—1. *Journey to the North of India, Overland from England through Russia, Persia, and Affghanistan.* By Lieutenant A. Conolly. London, 1834. 2 vols. 8vo. pp. 834.

2. *Travels into Bokhara, being the Account of a Journey from India to Cabool, Tartary, and Persia.* By Lieutenant A. Burnes, F.R.S. London, 1834. 3 vols. 8vo. pp. 1229.

Two interesting and important narratives of travels across Western Asia have been published within the last year, and are named above in the order of their appearance. They have both excited considerable attention, and been analyzed in almost every contemporary journal; so that under ordinary circumstances we should have thought only a very cursory notice of them here necessary. But as the author of the second has received from the Royal Geographical Society its Royal Premium for the current year, a somewhat more extended review of his labours seems indispensable; and in such an abstract it is impossible entirely to overlook the contemporary, and, though less important, the scarcely less meritorious, exertions of his brother officer.

It is, indeed, highly creditable to the East India Company's Military Service, that in one year two such works should have proceeded from it. There is an essential difference between them, doubtless; but the moral qualities of the travellers are similar, the dangers and difficulties which they overcame were of the same character, and the light which together they have thrown on the geography of North Western Asia is more steady and extended than any previously possessed. Much of what our travellers saw, indeed, was reported to Elphinstone and Fraser; and it is at once curious and interesting to observe how minutely accurate their hearsay accounts prove, in many instances, to have been.* But the mere want of confirmation under which these previously laboured detracted from their value. What was not known to be true was as though it had been false. And much as the public is indebted to Messrs. Burnes and Conolly, we know not if a peculiar debt be not due to them by the above gentlemen, for having proved how carefully, how laboriously, and how successfully they had sifted the desultory, and, without doubt, often contradictory statements made to them by their native authorities.

We have said above, that there is an essential difference between the works before us; and we mean by this a difference not in route only. Lieutenant Burnes's book is of a higher, because a more complete character throughout. Lieutenant Conolly appears to have had few or no instruments with him, and his curiosity seems to have been much more actively directed to the moral and political aspect of the countries which he traversed,

than to their topography. There is thus very little physical geography in his two volumes: and his map has been very imperfectly compiled here, without any aid from himself; it is, in truth, impossible to follow him with only its assistance. Lieutenant Burnes, on the contrary, was well provided with instruments, and studied to make his journey a flying survey. His map, compiled by one of our most laborious geographers*, from every available source, and largely benefited by his own labours, is without doubt the most perfect now existing of the country which it embraces. And his active, inquisitive temper, and general intelligence, enabled him, while on his journey, to direct his inquiries far and wide on both sides of his immediate route; so that he has made a large accession to the conjectural as well as precise geography of this part of Asia. We come now to particulars.

I. Lieutenant Conolly left England for India, in August, 1829; and having resolved to go overland, passed through Russia, and along the western shores of the Caspian, to Tabreez, whence it was his original purpose to proceed to Bushire, and thence embark for Bombay. Encouraged, however, by the facilities which seemed promised in Persia for effecting a journey across Toorkhistan and Affghanistan, and desirous of adding to the information possessed of these countries, he changed his plan and proceeded from Tabreez to Astrabad, where he arrived in April, 1830. There two roads lay before him—one by way of Khiva, Bokhara, and Caubul: the other through Khorassan, by Herat and Candahar, to the Indus; and, as being the most curious and difficult, he first decided on the former, prefacing the detail of his attempt to accomplish it with a brief account of the nomade tribes occupying the desert north and east of the Caspian, among whom he thus adventured. This does not materially alter, or add to, what Mr. Fraser has before given us; but is interesting as a general corroboration of it.

The Toorkmuns, according to Mr. Conolly, are divided into at least four, and probably more, principal tribes, almost always at war with each other, and with the neighbouring Persian posts. These, in the order of their occurrence, proceeding from Astrabad towards Khiva and the Oxus, are the Yimoots, Goklâns, Tekkahs, and Serruxes. Each has an allotted portion of the desert as its peculiar beat, and moves about within this, and frequently beyond it, as the wants of its cattle, or the predatory habits of its people, may suggest. The first and third are the most powerful; but each is subdivided into many families, which hold together by a

* Mr. John Arrowsmith. The map in question is No. 29 of his New Atlas, and should be used also with Mr. Conolly's book. With regard to the Atlas, see a further notice of it in this Journal, p. 320.

very slender bond of union. Shah Abbas introduced among them a tribe of Koords, whom he removed from the Turkish frontier to this locality, in hopes of protecting Persia by interposing them between it and the Toorkmuns; but the success of this policy has not been great. These Koords are now not the least powerful or restless of the neighbours of Persia in this direction.

The Goklans, being a small tribe, and often at enmity with the others, are the most submissive to, and dependent on Persia. They also live more settled than the others, and possess large herds and flocks. All the tribes, however, are divided into Charwars and Choomoors, that is, Rovers and Settlers; of whom the relative proportions vary in the several tribes. The distinction is one of employment, not family, a Charwar becoming a Choomoor, and *vice versa*, at will. Both breed horses; but those of the former, that is, those bred in the desert, are preferred. The former have also many camels, with flocks of sheep and goats, but neither oxen nor poultry. The latter have all, and, besides, cultivate grain. The individual wealth of many is great. Mr. Conolly mentions one who possessed 700 camels, 5000 sheep and goats, 200 mares, and several "necks'-full" of money. The Toorkmuns keep their money and other small valuables in large purses made of the necks of camels' hides.

For the privileges of pasture and cultivation, the Toorkmuns, according to their proximity, acknowledge a dependence on the Shah of Persia or Khan of Khiva; but they are very independent liegemen, to Persia in particular, and currently join in parties to carry off Persians into slavery. Being Soonnees in their religion, they sell Persians, whom, as Sheahs, they consider entitled to no better treatment, to their brethren in belief of Khiva and Bokhara. And thus an Astrabadee dare not penetrate the desert, even so far as Goorgaun, a considerable river almost on the boundary, without the safeguard of a Toorkmun; and a Toorkmun, in like manner, will not venture to Astrabad unguaranteed.

Among these wild tribes, then, Mr. Conolly first adventured, desirous of proceeding to Khiva. His companion was a native of Hindoostan, called Syud Karaumut Allee, who had long resided in Persia, and joined him at Tabreez; and of whose intelligence and presence of mind he uniformly speaks in high terms. They both passed as merchants; and bargained with a Toorkmun, called Peerwullee, to furnish them with four camels, and transport them and their baggage. Accordingly on the 26th April they set off and forded the Goorgaun, already noticed, which was here about sixty yards wide, and four feet deep. When the rains are down, however, it is a much more considerable stream, and held sacred by the Toorkmuns, who swear by it.

The travellers rode in kajavahs, or cribs, about four feet long by

two wide, in which they stowed their bedding, and sat or lay as they best could. A camel carries two of them, and they are balanced against each other with very little other fastening; so that they are both inconvenient and insecure. The direction of the route was northerly, and after leaving the meadow-land on the immediate banks of the river, the soil was dry and light, having here and there patches of good grass, but only small thorns and weedy bushes besides. On the 27th they crossed the Attruck, a river about as deep as the Goorgaun, but a third less wide, and 27 miles beyond it. Its immediate banks are again a better country, but beyond them the desert aspect returns.

On the 28th they passed the remains of what appeared to have been once a considerable town, but could obtain no information regarding it. Ruins are here usually called the forts of Roostum-e-Zal, Roostum the Son of Zal, the Hercules of Persian history. They also passed several small Yimoot encampments, where they obtained slight refreshments, as camel's *chaal*, or butter-milk, with boiled rice, &c. On the 29th little occurred of importance: but on the 30th, their course being still about N. N. E., they arrived at, and ascended for above two hours to the N. E., what appeared to be the deserted bed of a once very large river. Its breadth was 1000 paces, the bottom gravel and pebbles, the banks high and much worn, and occasionally broken into a succession of deep parallel ravines, each the size of a nullah. The travellers wished to believe this the (supposed) ancient course of the Oxus; and Mr. Conolly argues in favour of the probability that that river did once flow into the Caspian. But he admits that this particular spot is scarcely far enough north to correspond with the traditions on this head; and he is compelled to solve the physical difficulties arising from the known, or at least believed level of the country, and which for the most part incline geographers to doubt the truth of these traditions, by a still more uncertain one of an earthquake, said by Captain Moravieff to have occurred 500 years ago, and to have materially altered the general face of the country.

Beyond this river-course the aspect of the desert became perceptibly worse. It was a barren white plain, on which there was scarcely a blade of verdure; and the view, at even the shortest distance, was distorted by *mirage*. It is said in the East that this phenomenon is caused by the refraction of the sun's rays on a salt soil; and the soil here is strongly impregnated with salt, layers of it being often found on the surface, which, when seen through this *mirage*, have the appearance of white buildings. Bushes have thus also the appearance of a forest; and the figures of men or camels look spectral. A few horses and antelopes were seen in this tract, and the desert rat (an animal slighter than the common rat, with a tuft on the tip of its tail, and which springs with

four feet like a kangaroo) was every where common. The Arabs eat this animal as a dainty: the Toorkmuns are more nice. One cuckoo was seen; with some beautiful perroquets (the body green, head and wings of a rich brown colour); and one flight of birds like the Indian minas. "The scene," Mr. Conolly says, "was desolate, but there was great beauty in it in the stillness of broad twilight."

On the 2nd of May, the party was joined by four horsemen, friends of their guide Peerwullee, and who speedily showed themselves his accomplices in a plot to intimidate, if not rob and murder, the travellers. The next two chapters are accordingly occupied by a personal narrative of considerable interest, but not immediately to the purpose of this Journal. We shall not, therefore, follow it, but merely select points in it which seem deserving of notice.

The frequent occurrence of ruins in this desert has already been adverted to; and some of these are in good preservation. "*Meshed-e-Misreaun*," says Mr. Conolly of one of them so called, "was plainly visible about four miles to the west; and as we afterwards marched on, we passed close under the south wall of this ruined city. It was four-square, each face of somewhat more than three-fourths of a mile. We counted twenty-five bastions in the south face; they were chiefly of burnt brick, and some were double. Being mounted on camels we could see over the broken wall, before which was a nearly filled up ditch. In the centre of the ruined houses were two very high broken minarets, and a stuccoed mosque in good preservation; on two sides were also remains of high arched gates, such as now front royal residences in Persia. In advance of the south wall was a watch-tower, and fronting the eastern entrance was a large white mosque in excellent repair. Outside the city there had evidently been ruined houses and gardens; and at some miles distance we passed a broken mosque.

"Of Meshed-e-Misreaun we could obtain no satisfactory account; and from what the Toorkmuns said, it was evident that they knew nothing about it. They ascribe its ruins to an invasion of the Calmuck Tartars, which took place five hundred years ago; but I can scarcely believe that so long a time has elapsed since it was deserted. There are many other large ruined towns in advance of the present Persian frontier, which probably only fell to decay when the founder of the Karasmian dynasty invaded Khorassan at the death of Shah Ismael Sofi, three hundred years ago. We were told that there were many inscriptions inside of them, and that coins had been found and sold to Persian money-changers."

Considering the social system of the Toorkmuns, and their avowed predatory habits, both property and person were, on the

whole, safer among them than might be expected. Mr. Conolly's treacherous guide, Peerwullee, whose ultimate objects were scarcely concealed, and who frequently sought to fasten a quarrel on them that he might have a pretext for putting them in execution, was yet constantly restrained by the want of this pretext, and ultimately was compelled to release them on fair terms by the force of opinion in his tribe. Their baggage was also searched, and expenses were accumulated on them till their money was nearly all taken; but having come as guests, they were not directly plundered. When they came away, the horses on which they rode were only allowed to go a certain distance on the road; and Mr. Conolly assigns as a reason what shows lax moral principle, but yet a respect for law. When a Toorkmun sells a horse to one of his own people, he is allowed to specify, if he desires it, the places to which it is *not* to be taken; and if the buyer neglects the caution, and the animal is subsequently claimed at any one of these places, the loss is his own. But if the seller does not warn a purchaser against a place, and the horse is there proved a stolen one, he must refund the purchase-money.

The travellers altogether advanced about two hundred and ten miles beyond Astrabad, and had the remainder of the road to Khiva described to them. Their advance was to what is considered eight days' journey; it is twelve more to Khiva; and the country becomes progressively so much drier, that water must be carried. It continues, however, hard; and any sand met with is for the most part gathered into broad ridges, kept down by a little vegetation, near which water is generally found. The soil near the Caspian Sea, and rivers flowing into it, is of much better quality; and might, Mr. Conolly thinks, be easily cultivated. He thinks it probable, moreover, that the Russians, in prosecution of their almost avowed designs on Khiva, may, at some time or other, be induced to make this attempt; but he doubts their power of holding Turcomania permanently, however successful they might be in capturing Khiva, and retaining it for a short time.

The Khan of Khiva's authority is acknowledged by 300,000 souls: of whom about 30,000 are Oosbegs, lords of the soil by right of conquest; 100,000 are Sarts, the inhabitants of the country before the Oosbegs took it; about as many more are Kara-Kalpachs, who are settled near Lake Aral; and the remainder are Toorkmuns, a few Kirghiz, and some Taujicks, or domesticated people of foreign extraction. Much jealousy exists between the Oosbegs and Toorkmuns; the first being overbearing, and the latter mutinous: but the Khan of Khiva has more real power over all his subjects than the Shah of Persia.

The Tartar women are very plain, and when not quite young, even ugly; yet, though the Toorkmuns carry off many beautiful

Persian women annually for sale at Khiva and Bokhara, they very seldom intermarry with them. This is partly owing to covetousness, and partly to the degradation to which the offspring of such a marriage are condemned: they are called Kouls (literally, slaves), though they live among, and on general terms of equality with, the Eegs, or free-born. Certain important privileges are withheld from them, however; in particular, they are without the pale of ordinary social protection, and an Eeg of another tribe may kill one of them without entailing on himself a death-feud. They are becoming numerous, however; the more so as the stain is ineffaceable, and their children all remain in the same rank. By the same means their servitude is also becoming light.

Smoking is reckoned disgraceful among the Toorkmuns; and the reason assigned is a polemical one:—"It is written in the Huddees," as was explained to Mr. Conolly, "that he who makes himself like those of another tribe, becomes as one of that tribe. Now Sheahs, Hindoos, and Jews all smoke, and we by smoking would assimilate ourselves to them—which God forbid!"

The arms of the Toorkmuns are a sword, light lance, and, where possible, a gun; the bow and arrow are almost quite gone out. As soldiers they are extraordinarily patient of fatigue (as are also their horses); and as brave as most irregular troops, whose tactic it is to fight only at an advantage. They cover their heads with a large sheep-skin cap, and when on horseback generally wear boots with pointed iron-tipped heels; but their dress otherwise is not uniform, being made up frequently of articles taken in plunder.

On Mr. Conolly's return to Astrabad he joined a caravan of pilgrims proceeding to Meshed, to worship at the shrine of the Imaum Reza, the last of the immediate descendants of Allee, and the object of especial reverence to all devout Sheahs. Thence he accompanied a subsidiary Affghaun force on its return to Herat; where he was reduced to extreme difficulties by the want of the necessary funds to pursue his journey. With these he was ultimately supplied by a Candahar merchant, one of the Syuds or elders of Pisheen, a race supposed to be lineal descendants of Mahomet, and as such held in high reverence: they are settled in the valley of Pisheen, about three days' journey south of Candahar. This individual had been in India, and was familiar with the names of some of the most distinguished British residents there: he knew them also for benefits conferred on him:—"Mr. Elphinstone had given his brother's son a handful of money for answering a few questions; Mr. Cole of Mysore had bought a horse of him; Hunter Sahib had given him a rifle; we were a most excellent tribe, who never gave our words falsely; and, please God, he would take my debts on his head, and convey me safely

to Hindoostan." It was, no doubt, very gratifying to Mr. Conolly to be relieved from his difficulties; but the manner in which it was effected must have been even more gratifying still.

Under the guidance, then, of the good Syud Muheen Shah, the remainder of the journey was effected through Candahar, Quetta, Dauder, and Baugh, to Shikarpoor, and across the Indus at Bukkur. The utmost caution was necessary throughout, the wild Belooches habitually infesting the passes of the mountains traversed; and even worse enemies being often to be found in the lawless governors of the forts maintained to keep them and other marauders in check. But the holy character and the consummate address of the Syud surmounted all difficulties; and the disposition seems certainly strong in the Affghaun authorities, however hostile may be the intolerant impulses of their followers, to court the English power.

We shall now, however, return on our traveller's steps, and glean the principal facts to which he has called our attention. The routes between Astrabad and Meshed seem very various: three English travellers have recently traversed this ground—Mr. Fraser, Lieutenant Conolly, and, as we shall see in the sequel, Lieutenant Burnes; and each by a different road. This appears to proceed from the lawless state of the country, which makes it expedient for travellers to throw as much uncertainty over their movements as possible; and is facilitated by the contracted width and comparatively low elevation of the Elboorz, or Para-pomisan, chain at this point. Its course is nearly E. by S.; and although transverse valleys of a somewhat higher elevation, and more fertile character, intersect it on both sides, yet, as a general statement, it may be said, that the great Toorkmun Desert, on the one hand, and the salt desert of Yezd on the other, extend respectively to its base. Beyond Meshed it widens, and also rises to a higher elevation. Its southern face turns to the S. E., its northern proceeds on nearly as before; and it thus gradually blends with the mass of Hindoo Koosh, of which it is a prolongation.

The influence of this configuration of country on the moral and social condition of its inhabitants is very striking; and though not expressly pointed out, may be distinctly traced both in the pages of Fraser and Lieutenant Conolly. The immense contiguous deserts can only be occupied, at least in the absence of civilization, by wandering and predatory tribes; and even the hill-country is eminently adapted for the occupancy of unquiet spirits. Every mountain-top is a fastness, every pass a defile, every prolonged valley an opening for a sudden incursion; their conquests are rapid, but seldom complete—success is alternate, blood-feuds are perpetuated. Unless when the iron hand of a Nadir, or an Aga Mahomed Khan, presses on all alike, the whole is in con-

fusion; and we are almost reconciled to the sanguinary despotisms which, in a peculiar manner, stain the Persian annals, by observing that the sufferings of the people are yet more severe in the intervals between them.

The holy city of Meshed has been so well described by Mr. Fraser, that both Mr. Conolly and Mr. Burnes decline to add to the details given by him. Herat is a well-fortified town, three-quarters of a mile square. It contains about 45,000 inhabitants, most of whom are Sheahs—perhaps 1000 of the remainder are Hindoos; and there are forty families of Jews. It is, beyond all conception, filthy and dirty; from the main streets smaller ones branching off, which are covered over, and form low dark tunnels, containing every offensive thing. The suburbs and adjoining country, however, are singularly beautiful. The city is built four miles from hills on the one side, and twelve miles on the other; and this whole expanse is one beautiful extent of small fortified villages, gardens, vineyards, and corn-fields; brightened by many small streams of shining water, which cut the plains in all directions. A bund, or dyke, is thrown across the river Herirood, and its waters, turned into many canals, are so conducted over the whole vale of Herat, that every part is watered. The most delicious fruits are thus grown: and the climate is also salubrious, though cholera and small-pox, from time to time, make great ravages; and the general habits of the people are so extraordinarily filthy, that any contagious disease must spread rapidly among them.

Herat is at present the capital of the yet remaining Affghaun empire of Shah Kamraun, the nephew of Shah Shooja, to whom Mr. Elphinstone's embassy was addressed; but the principal part of his dominions are occupied by the rebellious brothers of his celebrated vizier Futteh Khan, whom, in his jealousy, he first blinded, and afterwards caused to be assassinated in his presence. The lower classes of his subjects still reverence in him the representative of their ancient monarchs; and while Mr. Conolly passed through the country he was witness to the cordiality with which they received a report that he was about to take the field against his enemies.* But his character is weak and avaricious; he is besides sunk in excess: and Mr. Conolly thinks it more probable that Herat will be speedily occupied by the Persians, and the Affghauns be driven farther east, than that their empire will revive, at least in the legitimate line.

There are three roads from Herat to Candahar, of which our traveller was taken by the most difficult, being the most hilly, and probably also the most secure. That taken many years ago by Mr. Foster is still the usual kafilah road; and the third is said to be similar to it. Along Mr. Conolly's route the population is

extremely thin, and the adjoining country was chiefly pastured, some favoured spots, however, being reserved for cultivation, chiefly in the neighbourhood of small towns, as Furrah, Subzaur, Ghore, and others, which have probably grown up from this circumstance. Candahar is itself a considerable city, containing, as Mr. Conolly was led to believe, a population of about 60,000 souls; but he was unable himself to visit it, being extremely ill, and lodged at a place called Ghoondee Munsoor Khan, about sixteen miles north, where his friend and guide had an establishment. Candahar is one of the considerable places of the empire possessed by Futteh Khan's brothers, who rule it oppressively, and are much disliked; describing it, the Syud's words to Mr. Conolly were, "You know what Heraut is! Well then, imagine, if you can, a town and people some degrees more filthy. Toof! I spit upon the beards of such beasts; I shall never be clean again."

Candahar is, however, the centre of a great trade, and though oppressed, the district in which it is situated must raise a great quantity of grain, as this is cheap in its market. The climate is not so favourable as that of Herat, but the soil is naturally better; and the supply of water being more copious, the labour of irrigation is in great measure spared.

The next place where our traveller halted for some days, and was most hospitably entertained, was the valley of Pisheen, or Pishing, the house of his guide Syud Muheen. This is about thirty miles broad, and twice as long; and is protected from injury in a turbulent neighbourhood, by the sanctity and peaceable profession of its inhabitants. Of the manners of these, their grades of society, genealogies, superstitions, amusements, and the like, Mr. Conolly gives a detailed account, conceived in a tone of interest which well becomes one so much obliged to them.

Quetta was his next considerable halt. It is the capital of the Belooche province of Shaul, and is a town of 400 small flat-roofed houses of one story, surrounded by a mud wall, in which there are four gates. In the centre is a citadel built on a high mound. The residents are Affghauns, Belooches, and Hindoos, the last of whom are all engaged in trade, which is considerable. Besides that which passes through, Quetta is a rendezvous where Indian and Affghaun merchants, not disposed to undertake the whole journey, meet and exchange their commodities. Horse dealers also resort here in considerable numbers, whence they either send their horses through Beloochistaun and Sinde to the sea-coast, where they are embarked for Bombay, or forward them direct to the Punjab, by the route which Mr. Conolly pursued. The Syud Muheen's chief venture, when escorting him, was horses.

Beyond Quetta the greatest physical difficulties occurred which

were met on the whole road. Hitherto the line of route had chiefly skirted the hills, ascending and descending small secondary elevations; but now the Kirklekkee hills were to be directly crossed, the first of a close and high series which divide Khorassan from the Upper Sinde. Several passes are in use across them, of which Mr. Conolly describes two—Bolaun, by which he passed, and another, of which he heard. Both are extremely difficult. Regarding Bolaun, his words are, "The minutest description could hardly convey a just idea of its strength; it is a defile which a regiment of brave men could defend against an army;" and regarding the other, "This road is so difficult, that it is only taken when danger is apprehended in the other defile. Horses all lose their shoes when they come this way."

Dauder is the next considerable town. "Viewed from hence," Mr. Conolly says, "the mountains which we had left presented the appearance of one very high range, coming up north from the sea, and crossing the Tukhatoo chain at right angles, so as distinctly to separate the mountains from the plain country." Dauder is about the size of Quetta, and one-third inhabited by Hindoos; the others are Yuts and Belooches. The plain on which it is situate is white and arid, and cracked like the dry bed of a marsh. Thirty-six miles farther is Baugh, a town of 2000 houses, also containing many Hindoos. The adjoining fields to it are watered by irrigation from the Narree, a river which, coming from the Tukhatoo, or Larree Mountains, runs south, and finally joins the Indus; and beyond this the road lay through the plain to Shikarpoor, marked from stage to stage with large villages, but not requiring particular notice.

Mr. Conolly adds to his book two appendices, one containing an epitome of modern Affghaun history, the other a discussion on the danger to be apprehended from the Russians advancing on India from the north-west. From what he states, this seems very slight; or, if it exist at all, it is at least distant: but as the subject is not purely geographical, we forbear to enter on it. We have been much gratified by learning, since the preceding was written, that Syud Muheen did not, at the close of the journey, go without the reward due to his generous conduct in the course of it. Besides many handsome presents, the Governor-General, Lord William Bentinck, offered him the loan, without interest, of fifty thousand rupees (5000*l.*), for three years, on condition that at the end of this time he should submit his accounts to examination, and thereby show the nature and value of the internal trade of his country: and, to a lesser extent, viz., twenty thousand rupees, this interesting experiment is now going on. Syud Muheen declined to be responsible for a larger sum.

II. Lieutenant Burnes's route was more extended than the above. He first ascended the Indus to Lahore, charged with presents from his Majesty to Runjeet Singh. He thence visited the Governor-General at Simlah; returned to Lahore; proceeded through Attock, Peshawur, Caubul, Balkh, Bokhara, and Meshed to Astrabad; visited the Persian court at Tabreez; and returned by way of Bushire and the Persian Gulf. As his memoir on the Indus has been already published in this Journal, we shall not go over that ground again; but, taking him up at Lahore, follow him step by step through his subsequent journey.

The mission to the court of Lahore having increased Lieutenant Burnes's desire to extend his travels, he proposed passing through Central Asia towards the Caspian Sea as an officer of the British army returning to Europe, a mode he considered more prudent than travelling as an accredited government agent. Having received from Lord William Bentinck, the Governor-General, the most liberal encouragement, and prevailed on Mr. James Gerard, surgeon of the Bengal army, to accompany him, he left Delhi on the 23d of December, 1831, and proceeded by express to Lodiana, a frontier station of British India.

Previous to entering on his journey, it was deemed necessary to receive permission of Runjeet Sing, the ruler of the Punjab, for which purpose a visit to Lahore was again to be made. Leaving Lodiana, he descended the Sutlege to its confluence with the Beas or Hyphasis, and after a journey of fifty miles encamped at Hurree, on the banks of the latter river below its junction with the Beas. These united rivers form a beautiful stream, never fordable, 275 yards wide at this season, but with an actual channel of one mile and a half in breadth; its velocity was two miles and a quarter an hour, perfectly clear, twelve feet in depth, and of the temperature of 57°. About this spot our travellers searched for the Altars of Alexander; which, according to Major Rennell, should lie between the Beas and the Sutlege, but without success. At Hurree, they were met by an escort from Runjeet to conduct them safely to Lahore, the roads not being altogether safe in consequence of the Seik fanatics; and on the 12th of January commenced their journey across the Manja, as the country between the Beas and Ravee is called. It is the highest portion of the Punjab, east of the Hydaspes; the soil is a hard indurated clay, producing thorny shrubs and brambles. The Mogul emperors had fertilized this tract by intersecting it with canals, traces of which may still be seen.

The first town they entered was Puttee, built in the reign of Akbar, and containing about 5000 persons; one of the royal studs was kept here containing about sixty brood mares, fed exclusively on barley and a kind of creeping grass. At the next town, called

Pidana, one of the principal sirdars or chiefs had been sent from Lahore to entertain them at his family mansion, a baronial castle, surrounded by a village peopled by his retainers. These buildings, though always in the military style, of a quadrangular shape, with lofty walls and turrets, are inferior to the fortified dwellings of the Rajpoot chiefs of the Marwar. In their progress to Lahore they entered on the great road of Juhangeer, a broad and beaten way once shaded with trees, and studded with minarets and caravanserais, many of which still remain to mark the munificence of the Mogul emperors.

On the 17th of January they reached Lahore, and were waited on by a deputation from the Maharaja, expressing the greatest friendship, and leaving a purse of 1100 rupees, a present which it was impossible to decline without giving offence. At Hurree and Pidana, the chiefs had presented them with bows and a purse of money, but in both instances the latter had been refused. On the following morning our travellers visited Runjeet Sing in an audience tent pitched in a garden about two miles out of the town, and surrounded by troops. His reception of them was marked with the greatest affability, and he requested them to continue as long as possible at his court, promising to show them some tiger-hunting, and to give them an entertainment at his palace. The country is said to be subject to earthquakes, and our travellers experienced a slight shock during their stay; yet the lofty minarets of Lahore afford a convincing proof that there can have been no very violent commotion of nature since they were built, about two centuries ago. This shock was felt, as they afterwards learnt, along the whole upper course of the Oxus at the same time, where villages were overthrown and some thousands buried in their ruins. The range of temperature is very great here, since the thermometer, which they were told had stood at 102° in July, now fell to 28°.

About a week after their arrival, they were invited to the Maharaja's camp, which was about twenty miles from the town, on the banks of the Ravee. The scene is described as magnificent—Runject's pavilion was of red cloth, while his troops and chiefs were cantoned in picturesque groups around. On the morning of the 27th, the whole camp was in motion; his highness was on an elephant bearing a *houda* of gold; his horses were led before him, and a small body of cavalry with a field-piece formed his escort. In the evening the tents were again pitched, and next morning saw them all prepared for hunting wild boars, with little probability of escape for the poor animals from a company of infantry, two or three hundred horsemen, foresters with rude halberds, a party of Seiks, and a pack of dogs of motley breed. The scene was lively and exciting; in half an hour eight monsters had bitten

the dust, and many more were entrapped in snares; and in the course of an hour and a half the party returned to their tents, where the successful sportsmen were rewarded. At the end of the month they returned to Lahore, where a hundred cannon announced the arrival of Runjeet Sing.

On the 6th of February the festival of the busunt (spring) was celebrated with great splendour. All the troops were drawn out uniformly dressed in yellow, which is the gala costume of this carnival; the Maharaja passed down the line, at the end of which were the royal tents lined with yellow, among which was a canopy of pearls and precious stones valued at a lac of rupees. At one end Runjeet took his seat, heard for about ten minutes the sacred volume of the Seiks, after which flowers and fruits were placed before him, and the nobles and other high personages, all dressed in yellow, were admitted to make their offerings in money.

The departure of our travellers from Lahore was delayed by an entertainment given by his highness, the description of which is worthy perusal. Having experienced the most condescending proofs of friendship from the Maharaja, and great kindness from Messrs. Allard and Court, two French officers in his service, they finally quitted Lahore on the forenoon of the 11th of February, and alighted that night at the ruins of the once splendid mausoleum of Juhangeer, across the Ravee, putting up in one of the garden houses that surround it. The tomb itself had lately been converted into a barrack for a brigade of infantry. Their first care was to divest themselves of every article of European costume and comfort, and to adopt not only the dress of the Afghans, but, what was rather more difficult, their habits and manners. The close dress, tents, beds, boxes, tables, and chairs, were all discarded for the flowing robe, a coarse carpet, and a blanket; and their now diminished wardrobe, with the necessary books and instruments, found place in the saddle-bags which were thrown across the horse's quarters.

Half way across to the Chenab, they halted at a garden well stored with flowers and fruit-trees; of the latter there were about twenty-eight different sorts, both European and Asiatic. When within about twenty miles of the river, the Himalaya mountains burst upon their view, overtopped with snow; they subtended an angle of fifty-one minutes elevation, and Lieutenant Burnes estimated their distance at 160 miles, and their height at least 16,000 feet. They reached the Chenab, or Acesines, at Ramnuggur, formerly called Russool, before the Mohammedan supremacy was overthrown. The country between the Ravee and Chenab is a little better cultivated and more fertile than that previously passed, the soil is sandy, and the wells in its centre are but twenty-five feet deep, with an average temperature of 70° Fahr. The climate at

this season is cold and bleak, frequently rainy, always cloudy, with the wind generally blowing from the north. The sugar-cane thrives; its juice is expressed by two horizontal wooden rollers, acted on by two lesser vertical ones, which are set in motion by a wheel turned by a pair of oxen; they produce a coarse sugar called "goor." Education is at a miserably low ebb, the prevailing opinion in the higher as well as the lower classes being that it is useless to a cultivator of the soil. They crossed the Chenab by a ferry; its breadth is 300 yards wide, with a depth of nine feet; its banks are low and speedily inundated in the rainy season, when it probably is, as Arrian describes it, a rapid stream: its velocity, however, did not now exceed one mile and a half an hour; and it is passable by a ford. The temperature was 53°; lower than the Sutlege, the Beas, or the Ravee. They halted at a mud mosque on the right bank of the river. The people are much afflicted with a disease called "noozlu," which is described as a running at the nose, wasting the brain and stamina of the body, and ending fatally; there is also much eye disease in the Punjab.

A journey of forty-five miles brought them to the Jelum, the Hydaspes of the Greeks, which winds its way through an alluvial plain at the base of a low rocky range of hills. On this they embarked, and sailed down the stream about five miles. The river abounds in crocodiles more than any other of the Punjab streams; it is a smaller stream than the Chenab, though at this season their breadth was similar; it is muddy, and rapid, as described by Arrian, the velocity being from three to four miles an hour. On disembarkation they crossed a rich and verdant plain to the town of Pind Dadun Khan, about 100 miles N.W. of Lahore, where they halted. The people are still the same as in the time of Alexander, "strong built, large limbed, and taller in stature than all the rest of the Asiatics." Pind Dadun Khan is the capital of a small district, and has a population of 6000 souls; it consists of three small towns close together, about four miles from the banks of the river. The houses are made of a framework of cedar, which is floated down from the Himalaya; a tree seen on the banks was thirteen feet in diameter.

The salt-range springs from the roots of the White Mountains crosses the Indus at Karabagh (described by Elphinstone), and terminates on the right bank of the Hydaspes, about five miles from Pind Dadun Khan. It forms the southern boundary of a table-land between those two rivers, which rises about 800 feet above the plains of the Punjab. The hills attain an actual height of 1200 feet from the valley of the Jelum, giving an elevation of 2000 feet above the sea; they exceed five miles in breadth. The formation is sandstone, occurring in vertical strata: vegetation is

scanty, and bold and bare precipices rise at once from the plain. Hot springs are found in various places; alum, antimony and sulphur also occur; but a red clay, chiefly seen in the valleys, is a sure indication of a salt deposit. The mine which Lieutenant Burnes examined was situated near the outside of the range, in a valley cut by a rivulet; it opened into the hill at about 200 feet from the base, by a narrow gallery of 350 yards in length, 50 of which may be taken as actual descent; this conducted into an irregular-shaped cavern, about 100 feet high, with walls formed of the bright and beautiful crystals of the red salt, which is deposited in regular vertical strata, none exceeding a foot and a half in thickness, and each distinctly separated from the other by a deposit of argillaceous earth, about an eighth of an inch thick. Some of the salt occurs in hexagonal crystals; the whole is tinged with red from the lightest to the deepest shade, but when pounded it is white. The caverns retain a more equal temperature than the external air; at this season they were at 64°, higher by 20° than the atmosphere; but in the hot weather they were described as being much cooler. Above a hundred persons, men, women, and children, were at work in the mine; their complexion was cadaverous, and appearance miserable, though they do not appear to be subject to any particular disease.

This salt is in high reputation in India on account of its medical virtues; but it is not pure, and, from a mixture of some substance (probably magnesia), is unfit for curing meat. About 800,000 maunds of Lahore (one of which is equal to 100 lbs. English) is annually extracted, but it is closely monopolized by the Punjab government.

Our travellers marched up the right bank of the Jelum to Jelalpoor, for about thirty miles, through a tract of rich land. The salt-range runs parallel with the river; many villages are perched on the outer hills, remarkable alike for their romantic situation and comfort. Jelalpoor has been, by some, considered the scene of Alexander's battle with Porus; but Lieutenant Burnes is rather inclined to identify that with the village of Jelum, higher up the river. The high roads from the Indus pass the Hydaspes at both places; but the latter is the great road from Tartary. At Jelum the river is divided into five or six channels, fordable at all times except during the monsoon. About fifteen miles below Jelum, and a thousand yards from the banks of the river, near the modern village of Darapoor, are some extensive ruins, called Oodeenuggur, three or four miles in extent; and on the opposite shore is a mound where the village of Moong now stands; our author believes the former to indicate the site of Nicæ, the latter of Bucephalia. Two Sanscrit coins were procured at Moong, and some copper ones, with Arabic inscriptions,

at Oodeenuggur. Lieutenant Burnes notices the singular coincidence between the numerical war-forces of Porus and Runjeet Sing, whom he styles the modern Porus, substituting, however, 300 guns for as many war-chariots. They now quitted the banks of the Jelum, and entered the country of Potewar, inhabited by a race of people called Gukers, famed for their beauty, and claiming a Rajpoot origin. Their approach to the Mohammedan countries became daily evident, from the women being veiled, and a change occurring in the costume; sixty yards of cloth were sometimes seen used in a pair of trowsers.

On the 1st of March they reached the celebrated fort of Rotas, considered one of the great bulwarks between Tartary and India; on the construction of which twelve years' labour and some millions of rupees were wasted. From Rotas, their road lay through a mountainous and rugged country of great strength. Water is abundant in the ravines, and is found also in wells thirty-five feet deep. To the right was seen the spot at which the Hydaspes issues from the mountain; it is called Damgully. There is no route into the valley of Cashmere by this river; and the most frequented one lies by Meerpoor and Poonch, about twelve miles to the eastward. On the 6th, the party reached the village of Manikyala, where there is a singular "tope," or mound of masonry, which has been described by Mr. Elphinstone; it has lately been opened, and some coins and other articles found: this mound may be distinguished at the distance of sixteen miles. Manikyala stands on a plain, and Lieutenant Burnes does not hesitate to fix upon it as the site of Taxilla. At this village they were made sensible that they were leaving Hindostan and its customs behind them, by finding a bakery common to the whole village. On the following day they arrived at an agreeable town called Rawil Pindee, distant twelve miles from the mountains, which were covered with snow. On the road they met a numerous body of Afghans, and also Hindoo pilgrims crowding from beyond the Indus to the great religious fair of Hurdwar.

About fifteen miles from Rawil Pindee, they passed the defile of Margulla, and descried the mountains beyond the Indus. This pass is narrow, over low hills, and paved with blocks of stone for 150 yards: the defiles continue for about a mile, when a bridge, over a rivulet, conducts to the next caravanserai; and at about twenty miles from Rawil Pindee, the party stopped at Osman, situated on a plain, at the mouth of the valley up which stands the fort of Khanpoor. About a mile beyond Osman, near the ruined village of Belur, is a "tope" or mound, similar to that of Manikyala, but not of such magnitude. These "topes" Lieutenant Burnes believes to be the tombs of a race of princes who once reigned in Upper India, either the Bactrian kings or their

Indo-Scythic successors. Seven miles beyond Osman, down the valley, is the garden of Hoosn Abdall, lying between two bare and lofty hills; passing which, the view opens upon the valley of Drumtour, that leads to Cashmere; and the range of hills at Puklee, covered with snow, was traced in chain with more lofty mountains beyond it. The fertile plain of Chuch and Huzara also lay before them.

Our travellers came in sight of the Indus at a distance of fifteen miles, whence it could be traced from its exit through the lower hills to the fort of Attok. They encamped at Huzroo, a mart between Peshawur and Lahore. The people were now quite changed; they were Afghans, and spoke Pooshtoo. On their march to the river, they passed over a spacious plain, well cultivated, and covered with rounded stones—an unerring proof of the agency of water. The spot at which they forded the Indus was about five miles above Attok, where the stream was divided into three branches, in the two first of which it gushed with amazing violence; and having, with great difficulty and risk, accomplished this undertaking, they proceeded to Attok, which stands on a black, slaty ridge, at the verge of the Indus. It is a place of no strength, and has a population of about 2000 souls. The garrison being in a state of mutiny, they were detained outside the town for two days, when they were ferried across the grand boundary of India on the 17th of March. The current exceeded six miles an hour; the water was azure blue; and about 200 yards above Attok, before the Indus is joined by the Cabool stream, it gushes over a rapid with amazing fury: a boat cannot live in this tempestuous torrent; but after the Cabool river has joined it, the Indus passes on in a tranquil stream, about 260 yards wide, and 35 fathoms deep, under the walls of Attok. At the confluence, an ignis fatuus is visible every evening. They found the fishermen on the Indus and Cabool river washing the sand for gold: some of the smaller streams, however, such as the Swan and Hurroo, yield more gold than the Indus.

The troops of Runjeet Sing escorted the party to their frontier, which is three miles beyond the Indus, where they met the Afghans, and advanced with them to Acora. Hence they traversed a beautiful plain, covered with thyme and violets, to the city of Peshawur, where they were received with the greatest kindness and attention by the chief Sooltan Mohammed Khan. Lieutenant Burnes considers the town of Peshawur so well described by Mr. Elphinstone, and all the ground over which he went, as to require no further addition on his part; his details, in this part of Afghanistan, are, therefore, confined more to incidents of a personal nature. The citadel of Bala Hissar, where the mission of

1809 had been so gorgeously received, was now a heap of ruins, having been burnt by the Seiks in one of their expeditions to this country. About five miles from the town, on the Cabool road, are the ruins of a "tope," similar to those of Manikyala and Belur; and it is said that there are eight or ten more of these towers towards the country of the Kaffirs.

The month which elapsed after their arrival at Peshawur so far increased the temperature, that they had no longer to fear the snows of Cabool and Hindoo Koosh; the thermometer had risen from 60° at mid-day, to 87°; and, after much procrastination on the part of the chief, the 19th of April was fixed for their departure. On that day they took leave of their kind friends, the chief placing them under the protection of one of his own officers, and not only giving them letters to several persons specifically, but also six blank sheets, bearing his seal, which our travellers were to fill up to any person who, they thought, could serve them. There are five different roads to Cabool, but they chose that which leads by the river, the pass of Khyber being unsafe, from the lawless habits of the people; and crossed the beautiful plain of Peshawur to Muchnee. Above this place they passed the Cabool river on a raft of inflated skins; the river is only 250 yards wide, but runs with amazing rapidity. Muchnee is a straggling village at the gorge of the valley, where the Cabool river enters the plain; and below that place it divides into three branches, in its course towards the Indus. Rafts are generally used on this river, though there are a few boats, in which the Mohammedan pilgrims embark, and pass down to the sea; but merchandise is never sent by this route. On the 23rd, they commenced their journey, and, after a fatiguing march over mountain-passes, found themselves again on the Cabool river, which was to be crossed a second time. Its breadth did not exceed 120 yards, but it rushed on with great rapidity, and the precipices on its bank rose to the height of about 2000 feet. The passage was made on rafts of inflated skins, and was tedious and difficult, on account of the eddies. On the following morning they reached Duka by a rocky road, and pushed on in the afternoon to Huzarnow, a journey of upwards of twenty miles. The view from the top of a mountain-pass, before descending into the valley of the Cabool river, was very magnificent. They could see the town of Julalabad, forty miles distant, and the river winding its way through the plain, and dividing it into innumerable islands. The Suffued Koh, or white mountain, reared its crest on one side, and, on the other, the towering hill of Noorgill, or Kooner, covered with perpetual snow, on which the Afghans believe the ark of Noah to have rested after the deluge. Not far from this place

is an isolated rock, called Näogee, in Bajour, which Lieutenant Burnes considers to answer the description of Arrian's celebrated rock of Aornus.

The route from Huzarnow to Julalabad—which city they reached on the morning of the 20th—lay through a wide, stony waste, a part of which is known by the name of Buttecote, and famed for a pestilential wind, or simoom, which is generally fatal. In a hill north of the Cabool river and the village of Bussoul are some extensive excavations in the rock, hewn out in groups, each having a separate entrance about the size of a common doorway; they are ascribed to the days of the Kaffirs, or infidels. Near Julalabad are seven round towers, differing, however, from the "topes" before mentioned. They are said to be ancient, and large copper coins are found near them. Between Julalabad and the mountains, the natives point out the tomb of Lamech, the father of Noah.

Julalabad is a small town, exceedingly filthy, with a bazaar of fifty shops, and a population of about 2000 people; but in the cold season the people flock to it from the surrounding villages. The Cabool river passes about a quarter of a mile north of it, and is 150 yards wide, but not fordable. There are mountains of snow to the north and south, running parallel with each other; the southern is called Sufued Koh, but more frequently Rajgul. It decreases in size as it runs eastward, and loses its snow before reaching Duka; in the higher parts the snow never melts, giving an elevation of about 15,000 feet. To the north-west, the lofty peaks of the Hindoo Koosh begin to show themselves. The travellers now left the river of Cabool, and passed up a valley to Balabagh; here grow famous pomegranates without seed, which are exported to India. At Gundamuk, the next place, they reached the boundary of the hot and cold countries, and, though only twenty-five miles from Julalabad, wheat, which was there being cut, was here only three inches above the ground. The mountains ten miles distant were covered with forests of pine, which commenced about 1000 feet below the limit of snow. At three miles from Gundamuk, they passed the garden of Neemla, and continued their march to Jugduluk, and passed the Soorkh road, or red river, where a variety of small streams pour the melted snow of the Sufueh Koh into that rivulet: their waters are all reddish; hence the name. The country is barren and miserable, and Jugduluk is a wretched place, with a few caves for a village. Our travellers could distinguish that a road had once been made, also the remains of the post-houses which had been constructed every five or six miles, by the Mogul emperors; these may even be traced across the mountains to Balkh. After passing the Soorkh road, they reached Ispahan, a small village, and,

by midnight of the 30th, arrived at the pass of Luta-bund, from the top of which the city of Cabool first becomes visible, distant twenty-five miles. The pass is about six miles long, and the road runs over loose round stones. Rising early, they prosecuted their journey to Cabool, which they reached in the afternoon, the approach to it being any thing but imposing. On their road, they passed the village of Boothak, where Mahmood of Ghizni is said to have interred the rich Hindoo idol from the famous Somnat.

Cabool is a noisy and bustling city; the great bazaar, or "Chouchut," is an elegant arcade nearly six hundred feet long, and about thirty broad, divided into four equal parts. There are few such bazaars in the East, and one wonders at the silks, cloths, and goods arrayed under its piazzas; acd the quantity of dried fruits, grapes, pears, apples, quinces and melons. In the poulterers' shops are snipes, ducks, partridges, plover, and other game. Each trade has its separate bazaar: there are booksellers and stationers; much of the paper is Russian, and of a blue colour. A white jelly strained from snow called "Falodeh," and blanched rhubarb called "Rhuwash," are great favourites with the people. Few cook at home, and Cabool is famous for its kabobs or cooked meats. There are no wheeled carriages in the town; the streets are not very narrow, and are intersected with small covered aqueducts of clean water; they are kept in good order. The houses are built of sun-dried bricks and wood, few of them more than two stories high; the population is 60,000 souls. The Cabool river runs through the city, and is reported to have inundated it three different times. During rain there is not a dirtier place than Cabool. According to the natives, the city is 6000 years old; it was once, with Ghizni, tributary to Bameean, but is now the capital over both; it is said to have been once named Zabool, hence the name of Zaboolistan. It is a popular belief that when the devil was cast out of heaven, he fell in Cabool. There are not exactly traditions of Alexander here; but both Herat and Lahore are said to have been founded by slaves of that conqueror, called Heri (the old name of Herat), and Lahore. No coins were procured except a Cufic coin of Bokhara, 843 years old, and Lieutenant Burnes heard of one at the mint of the size and shape of a sparrow's egg: triangular and square coins are common; the latter belonging to the age of Akbar. A colony of Armenians, consisting of some hundreds, were introduced into Cabool by Nadir and Ahmed Shah from Joolfa and Meshid in Persia, of whom only twenty-one persons are now remaining; and there are but three Jewish families out of one hundred which it could boast last year.

Since their departure, our travellers had so far kept pace with the seasons in the various climates, as to be travelling in a per-

petual spring. Cabool is 6000 feet above the sea, and its gardens, which are all beautiful, were now in full blossom, and afforded a great variety of fruits and flowers. The people are passionately fond of sauntering about them. The climate of Cabool is genial. At noon the sun is hotter than in England, but the evenings and nights are cool; there is no regular rainy season. The snow lasts for five months in the winter, and the prevailing winds are from the north. Cabool is celebrated for its fruits, and they make a wine* not unlike Madeira. The Bala Hissar, or citadel, is situated at the eastern extremity of the rocky hills which enclose the city to the south and west; it commands the city, but is not strong. It was built by different princes of the house of Timour from Baber downwards; the palace stands in it. Near it the Persians or Kuzzilbashes reside; they are Toorks, principally of the tribe of Juwansheer, who were fixed in this country by Nadir Shah. During their stay, our travellers witnessed the festival of "Eed," kept in commemoration of Abraham's intention to sacrifice his son Isaac, with every demonstration of respect. The tomb of Timour Shah, which stands outside the town, is a brick building of an octangular shape, fifty feet high, about forty feet square inside, and of an architecture resembling that of Delhi. The tomb of Baber also stands in the centre of a garden about a mile from the city; the grave is marked by two erect slabs of white marble, in front of which is a small but chaste mosque of marble also: near it are interred many of his wives and children.

The Afghans call themselves "Beni Israeel," children of Israel, yet consider the term "Yahoodee," Jew, to be one of reproach. They say they were transplanted by Nebuchadnezzar after the overthrow of the Temple, to Ghore, a town near Bameean, and that they lived as Jews till the first century, when Khaleed converted them to Mohammedanism; they have all the appearance of Jews, and have the Hebrew custom of the younger brother marrying the widow of the elder. From all he could learn, Lieutenant Burnes is of opinion that they are of Jewish descent; but in this there is probably a mistake.

Having spent nearly three weeks at Cabool, preparations were made for departure; but as no caravan was ready, they hired a Cafila-bashee, or conductor of the great caravan. A steward of one of the principal noblemen, who carried on great commercial intercourse with Bokhara and Russia, was appointed to accompany them; and they were furnished with letters from the chief and various other individuals from whom they had experienced great kindness. During their stay, the party had become acquainted with some of the Hindoo or Shikarpooree merchants, in whose hands is all the trade of Central Asia, and who have houses

of agency from Astracan and Meshed to Calcutta; and through them it became an easy matter to adjust their money-transactions, giving gold and a bill on Bokhara on the letter of credit with which Lieutenant Burnes was furnished by the Indian Government.

Thus prepared, they left Cabool on the 18th of May (Friday), after noontide prayers, according to the usual custom, and halted at night at a small village called Killa-i-Kâzee. Prudence dictated their proceeding very quietly in this part of their journey; they assumed the title of "Meerza," or secretary, a common appellation in these countries, and committed themselves to the charge of the conductor, like a bale of goods. They left the road which leads to Candahar, and followed the valley of the Cabool river, to its source at Sirchushma; the first halting-place was called Julraiz from its running brooks, and these it is that make the country enchanting, in spite of its bleak rocks. The valley was not above a mile in breadth, and most industriously cultivated; the hills on each side were covered with snow. At Sirchushma are two natural pools converted into fish-preserves, and said to be sacred to Ali, therefore they are never molested. Before entering the valley of the river, they left the famous Ghizni to the south; it is only sixty miles from Cabool. It is now a place of small note, but contains the tomb of Mahmood its founder, which has sandal-wood gates, originally from Somnat in India.

They wound up the valley till they reached a level tract on the mountains, the pass of Oonna, the ascent to which is guarded by three forts; they encountered the snow previous to reaching the summit, which is about 11,000 feet high, and crossing the pass, halted at a small village in the cold country of the Huzaras, who were only now ploughing and sowing. Continuing along the base of Kohi Baba, a remarkable ridge with three peaks on it rising to the height of about 18,000 feet, covered with snow, they reached, on the evening of the 21st, the bottom of the pass of Hajeeguk, and passed the night with a Huzara family near a little fort. These people said that the snow prevented them from stirring out for six months in the year, and that the barley sown in June was reaped in September. Money was of no value, every thing was purchased by barter. The Huzaras differ from the Afghan tribes, more resembling in physiognomy the Chinese; they are a simple-hearted people, of Tartar descent. Though living some of them at 10,000 feet elevation, they are quite free from goitre. From this resting-place the party commenced the ascent of the pass of Hajeeguk, about 12,400 feet above the sea; it was the 22nd of May, but the snow bore their horses, and the thermometer fell to four degrees below the freezing point. Beyond this they endeavoured to ascend to the pass of Kaloo, still 1000 feet higher, but

their progress was arrested by the snow, and they doubled it by passing round its shoulder, taking the side of a valley, watered by a tributary to the Oxus, which led to Bameean. The mountain-scenery with its frightful precipices was truly grand, and it was impossible to continue their route on horseback: the path appeared formerly to have been fortified, and they passed remnants of post-houses of the Mogul empire.

Bameean is celebrated for its colossal idols, and innumerable excavations, which are to be seen in all parts of the valley for about eight miles, and still form the residence of the greater part of the population; a detached hill in the middle of the valley is quite honey-combed with them, and brings to recollection the Troglodites of Alexander's historians. It is called the city of Ghoolghoola, and the caves are said to be the work of a king named Julal: they are dug on both sides, but the greater number lie on the northern side, where also are carved in relievo, on the face of the hills, two colossal idols. They consist of two figures, male and female, the one named Silsal, the other Shahmama, about two hundred yards apart. The male, which is the larger of the two, is about 120 feet high, occupying a front of nearly 70 feet, and extends about the same distance into the hill. The figure is covered with a mantle which hangs all over it, and has been formed of a kind of plaster; the niches have also been at one time plastered and ornamented with painting of human figures; the execution is indifferent, but the colours are still vivid. Near the bottom are apertures through which a road winds up the inside of the hill to the top of the figures. Rings, coins, &c., are found by digging; the latter generally bear Cufic inscriptions, and are of a later date than Mahommed. Bameean is subject to Cabool, and appears to be a place of high antiquity, perhaps the city which Alexander founded at the base of Paropamisus, before entering Bactria. The country from Cabool to Balkh is still called "Bakhtur Zumeen," or Bakhtur country. The caves and idols are described in the history of Timourlane.

After a day's delay at Bameean the party set out for Syghan, distant 30 miles; half-way they crossed the pass of Akrobat, where they left the dominions of modern Cabool and entered Toorkistan, called Tartary by Europeans. They now looked upon the range of great snowy mountains behind them; Kohi Baba is the principal continuation of the Hindoo Koosh. From Syghan they crossed the pass of Dundan Shikun, or the Toothbreaker, so called from its steepness and difficulty; and then descended into a narrow valley, that extended some miles beyond the village of Kamurd. The rocks rose on either side to the height of 3000 feet, frequently precipitous, nor was the dell anywhere more than 300 feet wide; no stars could be seen, nor any observations taken,

On the 26th of May they crossed the last pass of the Indian Caucasus—the Kara Koottul, or Black Pass—but had yet a journey of ninety-five miles before clearing the mountains. At the village of Dooab they descended into the bed of the river of Khooloven, and followed it to that place, among terrific precipices, where they met with a band of robbers, Tartar Huzaras, who however did not attack them. They continued their descent, by Khoorrum and Sarbagh, to Heibuk, which is but a march within the mountains; near it is a defile, called Dura i Zindan, or Valley of the Dungeon, so narrow, with adjoining precipices so high, that the sun is excluded from some parts of it at mid-day. A poisonous plant is found here, which is fatal to either mule or horse. Beyond this they began gradually to exchange the barren rocks for more hospitable lands. Herds of deer might be seen bounding on the rocks, and population became more numerous. Heibuk is a thriving village, with a castle of sun-dried brick built on a commanding hillock; the elevation of the village is about 4000 feet; its soil is rich, and the gardens exhibited the most luxuriant verdure: the fig-tree is found here. The houses have domes instead of terraces, with a hole in the roof for a chimney; so that the village has the appearance of a cluster of large brown bee-hives. They adopt this style of building as wood is scarce. The people wear conical scullcaps instead of turbans, and long brown boots; the ladies choose the brightest colours for their dress, are not scrupulous about being veiled, and are not ungainly in appearance.

On the 30th of May they made their last march among the mountains, and debouched into the plains of Tartary, at Khooloom or Tash Khoorghan, the country to the north sloping down to the Oxus. The last hills, about two miles from the town, rise at once in an abrupt and imposing manner, the road passing through a defile that might easily be defended. Khooloom contains about 10,000 inhabitants, and is the frontier-town of the chief of Koondooz, Morad Beg, who has reduced all the countries north of Hindoo Koosh under his yoke. Their intention was to have proceeded on the following day to Balkh, but they were desired to await the return of a messenger, who had been despatched to the chief at Koondooz, by whom they received a summons to repair thither. Lieutenant Burnes now resolved on personating the character of an Armenian, trusting his safety to the appearance of abject poverty; and set forth with most of his party, leaving, however, Dr. Gerard and his Hindoo servants at Khooloom. Besides the conductor, the steward, and the Hindoo customhouse-officer of Khooloom, whom Lieutenant Burnes had persuaded to accompany them, the caravan consisted of eight or ten tea-merchants, who, having disposed of their property, were returning to Budukh-

shan and Yarkund. Starting in the evening, they halted at the village of Ungaruk, twelve miles from Khooloom, to feed their horses; and then continued travelling till within an hour of dawn, by a dreary road, over two low passes, among hills not enlivened by a single tree, nor blessed with a drop of fresh water, for forty-five miles. About eleven in the forenoon, they reached the first fields, twelve miles from Koondooz, where they arrived at night-fall, having performed a journey of more than seventy miles. On the road, Lieutenant Burnes had an opportunity of entering into conversation with the Hindoo in his native tongue, which was not understood by the rest of the party, and discovered that this official was open to a bribe, and was willing to lend his weight to the following story, which was also made known to the conductor and steward:—that Lieutenant Burnes was an Armenian from Lucknow, a watchmaker, who, having learnt at Cabool of the existence of some relatives at Bokhara, was journeying thither; and that Dr. Gerard was a relative of his, but left at Khooloom from ill health. All the 4th they remained at Koondooz, where Lieutenant Burnes had an opportunity of seeing something of the people, who are passionately fond of tea, and—like the Turks with their coffee—nothing is done without it; the leaves of the pot are afterwards divided among the party, and chewed like tobacco. Most of the visiters were Tajik merchants, natives of Budukshan, trading to China, from whom were gathered some particulars regarding the reputed descendants of Alexander the Great, which are yet said to exist in this neighbourhood and the valley of the Oxus.

Early on the morning of the 5th they started for their interview with Morad Beg, whom they found at the village of Khaun-abad, about fifteen miles distant, and situated on the brow of the hills above the fens of Koondooz, and guarded by the fortified dwelling of the chief, in which were about five hundred cavalry, armed with long knives in their girdles, some of which were richly mounted with gold. The interview was critical, but on the positive assurance by the Hindoo officer, that the travellers were poor Armenians, an order was made out for their safe-conduct. From the torn and threadbare garb of Lieutenant Burnes, he was not even thought worthy of a question; and in the afternoon returned to Koondooz. The town lies in a valley, surrounded by hills on all sides, except the north, where the Oxus flows at the distance of forty miles; it is watered by two rivers, which join north of the town. The greater part of the valley is so marshy that the roads are constructed on piles, and run through the rankest weeds; yet wheat and barley are produced, as also rice. The heat is intolerable, and the climate very unhealthy; yet the snow lies for three months in the year. At one time Koondooz has been a large town, but

now its population does not exceed 1500 souls. The mountains of Hindoo Koosh lie in sight, south of the town, covered with snow; the neighbouring hills are low ridges, covered with grass and flowers, but destitute of trees. Farther up the valley, the climate becomes more genial and healthy. The chief, Morad Beg, is an Usbek of the Kudghun tribe, lately risen to power; he possesses all the valley of the Oxus, and but recently held sovereignty over Balkh. After a fatiguing march of twenty hours constantly in the saddle, Lieutenant Burnes again joined Dr. Gerard, at Khooloom, to the heartfelt joy of both; and not wishing to incur any more risks, they prepared to set out the following morning, the 8th of May, and in the afternoon reached Muzar, thirty miles distant from Khooloom. The country between these places is barren and dreary, and the road leads over a low pass, called Abdoo; on the route they observed a magnificent mirage, a snaky line of vapour as large as the Oxus itself, and which had all the appearance of that river.

Muzar contains about five hundred houses, and is within the limits of the canal of Balkh; it can muster about 1000 horse, and is independent of that city and Khooloom. Muzar means a tomb; and this place was built about three hundred and fifty years ago, and dedicated to Ali. At this town, Mr. Trebeck, the last of Moorcroft's unfortunate party, expired; he is buried outside the town. On the morning of the 9th of June they entered the ancient city of Balkh, where they remained three days, to examine the ruins of this once proud city.

The remains extend for a circuit of about twenty miles, but present no symptoms of magnificence; they consist of fallen mosques and decayed tombs, built of sun-dried bricks, none of the ruins being of an age prior to Mahommedanism. It is still called, by the Asiatics, "Mother of Cities," and is said to have been built by Kyamoors, the founder of the Persian monarchy. It continued the residence of the Archi-magus till the followers of Zoroaster were overthrown by the inroads of the Caliphs. Its inhabitants were butchered in cold blood by Jenghis Khan; and under the house of Timour it became a province of the Mogul empire. It formed the government of Aurungzebe in his youth, and was at last invaded by the great Nadir. Under the Dooranee monarchy it fell into the hands of the Afghans; and within the last eight years has been seized by the king of Bokhara. Its present population does not exceed 2000 souls, chiefly natives of Cabool; also a few Arabs. The city appears to have enclosed a number of gardens; there are the ruins of three large colleges of handsome structure. A mud wall surrounds the town, which must be of a late age, since it excludes the ruins, on every side, for about two miles. The citadel, or *ark*, on the northern side, has

been more solidly constructed, yet is a place of no strength: in it is a stone of white marble, pointed out as the throne of Kai Kaoos, or Cyrus. Balkh stands on a plain, 1800 feet above the sea, about six miles from the hills; the city itself has become a perfect mine of bricks for the surrounding country; they are of an oblong shape, rather square. The fruit of Balkh is most luscious, particularly the apricots. Snow is brought from the mountains, about twenty miles from the southward, and sold for a trifle. The climate is insalubrious, but not disagreeable; its unhealthiness is ascribed to the water, which is so mixed up with earth and clay as to look like a puddle after rain; the soil is like pipe-clay, and very rich; when wet it is slimy; the crops are good, and the wheat grows as high as in England. The water has been distributed by aqueducts from a river; these frequently overflow and leave marshes, but the country itself is not naturally marshy, as it slopes gently towards the Oxus. Lieutenant Burnes obtained some copper coins, Persian, Cufic, and Arabic; and examined a whole series of those of the emperors of Hindostan. The tombs of Moorcroft and Guthrie are outside the town.

On the 12th of June, the caravan assembled outside the town, and at midnight our travellers left Balkh, on camels, bearing panniers, which held one person on each side, when a march of thirty miles brought them to the limits of the waters of Balkh. Lieutenant Burnes observes, that the language of the most graphic writer could not delineate this country with greater exactness than Quintus Curtius has done. On the 14th, they entered the desert, and travelled all night towards the Oxus. They left the high road, from fear of robbers, and journeyed westward, halting at daylight near a settlement of Toorkmuns, consisting of a few round huts. The mountains of Hindoo Koosh had entirely disappeared below the horizon, and the wide plain, like an ocean of sand, surrounded them on all sides. At sunset they saddled, and after a journey of fifteen hours (thirty miles), found themselves on the banks of the Oxus, near the small village of Khoju Salu. The river was upwards of 800 yards wide, and 20 feet deep; its waters were loaded with clay, and the current ran at the rate of about three miles and a half an hour. It is called Jihoon and Amoo by the natives. They crossed it in the following singular manner: a pair of horses was yoked to each boat, no oar was used to assist them, only a rude round pole to prevent the boat wheeling in the current; they sometimes use four horses. Having passed the river, they commenced their journey towards Bokhara, and halted at Shorkudduk; they next reached Kir Kooduk, the stages being about twenty-five miles, travelling chiefly during the night, the thermometer, which stood at 103° in the day, then falling to 60°. The next march, to a place called Kirkinjuk, brought

them to a settlement of Toorkmuns, and the country changed from hillocks to mounds of bare sand. At sunset of the 20th, as they approached the town of Kurshee, they descried to the eastward a stupendous range of mountains, covered with snow; the distance was estimated at 150 miles, and their elevation far exceeded that assigned to any range north of Hindoo Koosh. They could distinguish them faintly at daylight next morning, when they came to the oäsis of Kurshee, but never saw them again. This spot was a cheering sight after having marched from the Oxus (eighty-five miles) without seeing a tree. Here Lieutenant Burnes, Dr. Gerard, and several of the party, were attacked with fever, supposed to have been caught at Balkh or on the banks of the Oxus, and which prolonged their stay at Kurshee three or four days: in the mean time, however, they sent forward a letter to the minister of Bokhara, to announce their approach, to which a message of welcome was returned.

Kurshee is a straggling town, about a mile long, with a considerable bazar, and about 10,000 inhabitants; the houses are flat-roofed, and mean. A mud fort, surrounded by a wet ditch, forms a respectable defence on the south-west side of the town. A river, rising at Shuhur Subz, fifty miles distant, passes north of the town, and its banks are adorned with gardens groaning with fruit; beyond the banks, however, everything is barren and sterile. Kurshee is the largest place in the kingdom of Bokhara, next to the capital; its oäsis is twenty-two miles broad. From Kurshee they marched to Karsan, a thriving village, sixteen miles distant, at the extremity of the oäsis. The second stage brought them to Kuroul-tuppa, where there is a caravanserai, built by Abdoolla, king of Bokhara, in the fifteenth century; and they passed three large reservoirs, built by this philanthropic prince. Their next stage brought them, early on the morning of the 27th of June, to the great eastern capital of Bokhara.

Bokhara is a very ancient city, tradition assigning its foundation to Alexander the Great; and the nature of the country around makes it probable that it was occupied, more or less permanently, even before his time. The circumference of the present city exceeds eight miles, and its population is about 150,000 souls. Its shape is triangular; and it is surrounded by a wall of earth twenty feet high, and pierced by twelve gates. Few great buildings are seen from its exterior, but when the traveller passes the gates he winds his way among lofty and arched bazaars of brick, and sees each trade in its separate quarter of the city. Everywhere, also, he meets with ponderous and massy buildings, colleges, mosques, and lofty minarets. About twenty caravansaries contain the merchants of different nations; and about one hundred ponds and fountains, constructed of squared stone, supply, when themselves

supplied, the population with water; but the city is six miles from the river, and is frequently much distressed for want of good water. When the travellers were here, the canals had been dry for sixty days.

The wisdom and excellence of the government at present established at Bokhara seem to promise to make it also a place of yet growing importance. We cannot enter here into particulars on this head: but the mixture of severity and indulgence; strict Mohammedanism in his own person, with toleration for the opinions of all others; total ignorance respecting Europeans, with a sufficient perception of their superiority to give a strong desire to see them in his bazaars;—altogether constitute the Koosh Begee, as he is called, or Lord of all the Begs, a very remarkable person. He is not sovereign of Bokhara, but prime minister to the Sooltaun, who bears the title of Commander of the Faithful, but appears to interfere little with the government. The travellers saw him, but were not presented to him; with the Koosh Begee they had many interviews, and received much kindness from him.

The ancient and famous city of Samarkand is 120 miles from Bokhara; and the travellers were within two marches of it when at Kurshee, but it was impossible for them to visit it. It has declined to the rank of only a provincial town of eight or ten thousand inhabitants, and gardens now occupy the place of its streets and mosques: but it is still regarded with great veneration by the people. An obelisk, 150 feet high, at Bokhara, is said to be raised to the level of its site. Three of its colleges are said to be still perfect: one of them that which formed the observatory of the celebrated Ulug Beg. In Bokhara there are no fewer than 366 colleges; of which a third contain seventy or eighty students, the others are smaller; they are all well endowed, and fixed allowances are given both to the professors and students. Unfortunately, however, they are exclusively devoted to the study of theology, and are ignorant even of the historical annals of their own country.

Bokhara, among other branches of trade, has an extensive slave-market; the Uzbecks managing all their affairs by means of slaves, who are chiefly brought from Persia, as we have already noticed in this article, by the Toorkmuns: but Russians and Chinese are also to be found among them.

Our travellers remained in Bokhara about a month; but on the 21st of July they left the city, having been placed, by the Koosh Begee, under the special care of the conductor of a caravan bound to Meshed, and bivouacked, for the first night, in a field about half a mile from the gates. Three short marches brought them to the home of the cafila-bashee or conductor of the caravan, a small village of twenty houses, called Murabad, forty

miles from Bokhara, and in the district of Karakool; where they learnt that the merchants, having taken alarm at the proceedings of the Khan of Khiva, had all declined to advance. They, however, resolved on sending a messenger to the Khan, desiring to know what levies he demanded, and what they had to expect: the document was dispatched by a Toorkmun, who promised to bring an answer on the eighth day; and the principal merchants of the caravan returned to Bokhara, while our travellers remained at Meerabad. Four or five miles from the city, they entered on a tract of country which was at once the extreme of richness and desolation; to the right the land was irrigated by the aqueducts of the Kohik, and to the left the dust and sand blew over a region of dreary solitude. After travelling twenty miles to the W.S.W., they found themselves on the banks of the river of Samarcand, which did not exceed the breadth of fifty yards, and was not fordable. It had much the appearance of a canal; and the stripe of cultivated land on each side did not exceed a mile in breadth, for the desert pressed closely on the river. The number of inhabited places was yet great, and each settlement was surrounded by a wall of sun-dried brick, as in Cabool, but the houses are neither so neat nor so strong. The direct course which they were pursuing to the Oxus led them away from the Kohik, but after crossing a belt of sand-hills, about three miles wide, they again descended on that river. Its bed was entirely dry, its scanty waters being dammed at Karakool; it does not flow into the Oxus, but forms rather an extensive lake, called "Dengir" by the Uzbeks. In the neighbourhood of Meerabad, our travellers fell in with the ruins of Bykund, said to be one of the most ancient cities of Toorkistan: it lies about twenty miles from Bokhara, and appears to have been once watered by an extensive aqueduct, the remains of which may still be traced It is now quite deserted, but the walls of some of its buildings remain.

At midnight of the 10th of August, the messenger returned from the Orgunje camp, and brought the necessary passport on a dirty scrap of paper, with which he was obliged to proceed to Bokhara, to the merchants who had returned thither. The caravan soon re-assembled, and on the morning of the 16th of August, about eighty camels appeared, to prosecute the journey to the Oxus, all laden with the precious lambs' skins of Karakool. At mid-day they commenced their march towards that river, which was twenty-seven miles distant.

After journeying ten miles, they halted in the evening at a small village, and set out again at midnight for the river. Their route led them among vast fields of soft sand, formed into ridges like those on the verge of the ocean: the belt of sand hills between Bokhara and the Oxus varies in breadth from twelve to fifteen

miles. They are utterly destitute of vegetation, and preserve a remarkable uniformity, all being of the shape of a horse-shoe, the outer rim to the northward, from which quarter the winds of this country blow. On this side the mounds sloped, while the inner edge was precipitous; none of these hills exceeded fifteen or twenty feet in height, and all rested on a hard base. The thermometer rose in the day to 100°, and fell to 70° at night. About four miles from the Oxus they came to verdant fields irrigated by that river. The point where they had come down upon the Oxus was at Betik, opposite Charjooee, one of the greatest ferries between Persia and Toorkistan; the boats and baggage were therefore soon transported to the opposite bank. From the farmer of the ferry Lieutenant Burnes learnt that the river had been frozen over the year preceding, which is a very unfrequent occurrence. The stream of the Oxus was here 650 yards broad, and in some places twenty-five to twenty-nine feet deep; its banks are much depressed and overgrown with a rank weed which chokes the aqueducts. Some fish of an enormous size, weighing from 500 to 600 pounds, of the dog-fish kind, are produced in this river, and used as food by the Uzbeks. This fine river was now for the first time turned to the purposes of navigation, since there is a commercial communication kept up by means of it between Charjooee and Orgunje. Charjooee stands six miles from the banks of the Oxus: it is pleasantly situated on the verge of culture and desolation, with a pretty fort on a hillock overlooking the town, and is said to have resisted the arms of Timour. The population does not exceed 5000 souls, but the greater part of them wander up and down the Oxus during the hot months. In the bazaar were knives, saddles and bridles, cloth and horsecloths of native manufacture, but the only articles of European fabric were a few beads and chintz skull-caps. Most of the people in the bazaar were Toorkmuns of the Oxus, and the different articles were arranged in separate parts of the bazaar. Every one having supplied their wants at this last inhabited spot of civilization between Bokhara and Persia, and every vessel being filled up with water, the caravan commenced its march at noon of the 22nd; it consisted of about 150 persons, with 80 camels. Some travelled in panniers placed on camels, some on horses, and some on donkeys, but even the meanest had some kind of conveyance. The mode of travelling is to start at mid-day and march till sunset, and after a couple of hours' rest to resume the task and continue till daylight, when they usually reach the next stage. Their first stage was to a well of brackish water called Karool, twenty-two miles from Charjooee: the whole tract was a dreary waste of sand-hills, but not entirely destitute of vegetation, as there were some shrubs on which the camels browsed. On

their march they met a party of Toorkmuns returning with seven Persian captives taken near Meshed.

From Karoul they quitted the high road of the caravans, which leads to Merve, and proceeded westward into the desert, as the officer commanding the Orgunje army had sent a messenger to direct their march upon his camp. On the following morning they reached the well of Balghooee, twenty-four miles distant, where, having emptied it, they had to wait till night, that it might fill again. In this march the desert was overgrown with brushwood, but entirely destitute of water; a few rats, lizards, and beetles, with occasionally a bird, were its only inhabitants. Some of the sand-hills now attained the height of sixty feet, but at that elevation they are invariably bare of all vegetation. There was nothing peculiar in the colour of the sand, which was quartzose. The heat of the sand rose to 150°, and that of the atmosphere to 100°. After a day's detention to rest the camels, they marched at sunrise, and continued with only a short halt till the same time next day, making a stage of thirty-five miles to a fetid well called Seerab. The desert now presented an undulating and uneven country of sand partially covered with shrubs, and the soil was salt in some places. Their next march brought them at midnight to Oochghooee, or the Three Wells, where they met some wandering Toorkmuns, the first since leaving the Oxus. The country continued to change as they advanced, becoming more flat and free from sand. Next day, at noon, they again set out, and by sunset found themselves among the ruins of forts and villages now deserted,—the ancient remnants of the civilization of the famous kingdom of Merve; and after a cool and pleasant march over a flat and hard plain, they found themselves about nine on the following morning at a large Toorkmun camp, near the banks of the Moorghab, at a place called Khivajer Abdoolla. They here learnt that the Orgunje camp lay on the other side of the river, which was not fordable but at certain places; and the merchants decided that they themselves, with the conductors of the caravan, should proceed in person to conciliate the officer in charge, while our travellers were left with the slaves and drivers, praying most heartily for their success.

Speaking of the desert in a military point of view, Lieutenant Burnes thinks it almost impracticable for an army of modern times to cross it, from the very scanty supply of water to be obtained, and the scarcity of grass for the cattle; but it might be traversed by light cavalry capable of moving with rapidity, and taking different routes, there being one both to the east and west of the high road to Merve. The Toorkmun camp where they halted consisted of about 150 conical moveable huts, which

were perched on a rising ground; countless flocks were at pasture around it, tended by only one or two individuals aided by dogs of the mastiff breed. The party who had proceeded to the Orgunje camp returned next morning with an officer commissioned to collect the tax, which he declared to be one in forty. The merchants treated him with marked attention, and began to give an account of their wares, which fear of discovery caused to be a very exact one. The scene is described as very amusing. Being now at liberty to proceed, they moved at dawn of the 29th of August, and followed the course of the Moorghab for twelve miles before they could cross it. Its breadth was about eighty yards, and five feet deep, running within clayey banks at the rate of five miles an hour; they crossed by an indifferent ford, over a clay bottom, at a place called Uleesha, but there is no village. This river rises in the mountains of Huzara, and loses itself in a lake about fifty miles N.W. of Merve; it is the Epardus of Arrian. The country is covered with the tenements of the Toorkmuns, who cultivate by irrigation, and everything grows in rich luxuriance. About Merve the country is called Maroochak, and is very unhealthy. On the 30th, they retraced the greater part of the previous day's route, travelling along the opposite banks of the Moorghab about sixteen miles; and again halted at a Toorkmun settlement called Kunjookoolan, when they commenced their march in the desert westward of that river, making a progress of thirty-seven miles. The tract was entirely different from the opposite side, and about midway the desert changed to a hard flat surface, which it afterwards preserved; the country was destitute of water, but there were the remains of many caravansaries and cisterns built by Abdoolla Khan of Bokhara. In this neighbourhood they witnessed a constant succession of whirlwinds that raised the dust to a great height, and moved over the plain like water-spouts at sea. As they halted on the morning of the 1st of September at a ruin called Kalournee, they descried the high lands of Persian Khorasan, and observed a magnificent mirage in the same direction. In approaching Shurukhs they could perceive a gradual rise in the country; and exchanged the shrubs of the desert for the tamarisk and the camel's thorn. They reached Shurukhs at sunrise of the 2nd, having performed a journey of seventy miles in forty-four hours, including every halt, or thirty-two hours' actual marching. This is a Toorkmun settlement, consisting of a small weak fort, situated on a hillock, under cover of which most of the inhabitants have pitched their dwellings. There are a few mud houses, which have been built by the Jews of Meshed, who trade with these people. Two thousand families of the Salore tribe, the noblest of the race, are here domiciled; and as many horses, of the finest breed, may be raised in case of need: they pay a

doubtful allegiance to Orgunje and Persia. The country around is well watered by aqueducts from the rivulet of Tejend: the soil is exceedingly rich, and possesses great aptness for agriculture. The crops of wheat, juwaree, and melons, are most abundant; but not a tree or bush enlivens the landscape. At this place, our travellers experienced great alarm at the prospect of detention; but through the influence of the principal merchants of the caravan, this difficulty was overcome by bribing the Toorkmun chief with their stock of tea and about twenty-six shillings in cash.

Their stay at Shurukhs, which was occasioned by the fear of a large party who were sent from the Orgunje camp on a foray to the Persian frontier, gave Lieutenant Burnes an opportunity of seeing much of the manners, &c. of the Toorkmuns. Their tents are about twenty-five feet in diameter, the sides of lattice-work, and the roof formed of laths, branching from a circular hoop about three feet in diameter, through which the light is admitted. The floor was spread with felts and carpets of the richest manufacture, looking like velvet; fringed carpets were also hung up round the tent, on one side of which was a press, in which the females of the family kept their clothes, and above it were piled the quilts on which they slept; yet the whole tent can be transported on one camel, and its furniture on another. They have no mosques, but say their prayers in the tent or in the desert, without ablution; there are also but few priests among them, and those very poor, for the church has little honour among them. Their marriage customs are romantic.

On the seventh day after their arrival, the party of whom they stood in awe began to arrive, having made their foray up to the very walls of Meshed, and captured 115 human beings, 200 camels, and as many cattle, a fifth part of which was the portion of the Khan of Orgunje, by whom they had been dispatched. At length, on the 11th of September, they joyfully quitted Shurukhs at sunrise; their caravan having been increased by the junction of two others during their stay. In the afternoon they halted at a cistern, eighteen miles from Shurukhs, the fort of which was still visible, having traversed a level country broken in some places by gravelly hillocks. At the third mile they crossed the dry and pebbly bed of the small river of Tejend, which rises in the neighbouring hills, and is lost in the sands; its pools were saline, and much of the soil was also salt. No such great river as the Ochus nor the Herat river, of our maps, has existence. About eight at night, they again set out, and having advanced seven or eight miles, entered among defiles and hills, and found themselves, a little after sunrise, at Moozderan or Durbund, the frontier post in Persia, and forty-five miles from Shurukhs. The latter part of the route lay in a deep ravine, and they pushed forward from fear

of the Allamans, or robbers of the desert. Eleven look-out towers crown the crest of the range, and command the pass of Durbund. The caravan alighted in the fields beyond the fort of Moozderan, which stands on an isolated spur of table land, in descending the pass: it is now in ruins, having been razed by the Khan of Orgunje, some years since, who seized all the inhabitants. There is a spring of tepid water under Moozderan, which makes for itself a channel down the valley.

Leaving Moozderan, they wound up the valley of the Tejend, here a beautiful brook, and arrived, a little after noon of the following day, at Ghooskan, the first inhabited village of Persia, about fourteen miles from Meshed. It is peopled by Teimurees, a tribe of Eimaks, and has a population of 1000 souls. In the night they left Gooskan, and reached Meshed, before the sun had risen on the morning of the 14th of September. The minute and correct account of this city given by Mr. Fraser, Lieutenant Burnes observes, precludes the necessity of his entering into any detail. They received great attention and kindness from some English residents, and gladly exchanged the habits of the desert for those of civilization. By the return of a messenger who had been sent to the camp of Prince Abbas Meerza, they received an invitation to pay their respects to his royal highness, which they did after a week's stay in the holy city, and visiting the sacred shrine of the Imam Ruza. They marched up the valley of Meshed, towards Ameerabad, a distance of forty miles, and bivouacked in the fields for the night. About twelve miles from Meshed, they passed the ruins of Toose, the ancient capital of Khorasan. Sixty miles higher up the valley, on the third day from Meshed, they reached Koochan, a town which Abbas Meerza had just taken from the Koords. This place, which stands 4000 feet above the sea, is said to be the coldest spot in Khorasan: the thermometer fell to 29° at sunrise in September. The valley varied in breadth from twelve to twenty miles, and there are some verdant spots under the hills, where the best fruit is produced, otherwise the country is bare and bleak. The hills are even destitute of brushwood, and rise to the height of 2000 to 3000 feet above the valley; the roads are hard and excellent. They passed many villages by the way, now deserted on account of the war. At the camp they met with European officers in the Persian service. Koochan is a strong fortress, about a mile and a half in circumference, and surrounded by a ditch thirty-five feet deep and twenty broad, which the captors were filling up; it was garrisoned by 8000 men. In the evening they were introduced to the prince, who was very inquisitive regarding their travels, and gave them an order ensuring their protection on their route among the Toorkmun tribes to the Caspian Sea.

Here the travellers separated, Dr. Gerard having resolved to turn down upon Herat and Candahar, and thus retrace his steps to Cabool. On the 29th of September, Lieutenant Burnes joined Humza Khan, who had lately been appointed governor of the Toorkmuns east of the Caspian, and proceeded with a party of about 300 persons, composed of Koords, Persians, and Toorkmuns. They bivouacked, after a march of thirty-six miles, beyond Shirwan, a strong fortress, with a deep wet ditch, now being dismantled. They followed the course of the Atruck river, which rises near Koochan, till within ten miles of Boojnoord, rather a large place, when they left it running westward as a small rivulet, and crossed several mountain ridges. A march of thirty-eight miles brought them to Boojnoord, standing in a valley, and the residence of a Koord chief, who had prudently tendered his allegiance on the approach of Prince Abbas. Here they saw, for the first time, the wandering inhabitants, the Ilyats of Khorasan, about a thousand of whose black tents were scattered around. About four miles beyond Boojnoord they left the valley in which it is situated, and entered among hills, which, to the southward, were covered with pine trees. The climate was moist and pleasant, and there were many rich spots of cultivation among the bare hills. Though the country was mountainous, the roads were excellent, and, after a march of thirty-six miles, they reached Kila Khan, in the district of Simulghan, which is richly watered from the hills. A march of thirty-eight miles brought them to the site of the village of Shahbaz, but the inhabitants had all been transferred to Mazenderan. The tribe of Gireilee had formerly peopled this part, but human beings appear to be here considered as much property as horseflesh. They were now travelling among mountains, with alternate hill and dale, and over a wild and romantic country; there were a few stunted pines on the hills, but they were oftener bare of everything but grass. On their road they witnessed the running down of partridges, on horseback, by the Toorkmuns of their party. Six miles from Shahbaz they took leave of the hill and dale, and descended into a valley, which contained the source of the river Goorgan; and their day's journey brought them among the tenements of the Toorkmuns of the tribe of Goklan, which contain about 9000 families. The different groups of tents were pitched in the open lawn by the side of a rivulet running through the dell, and around flourished the fig, vine, pomegranate, raspberry, mulberry, black currant, and hazel. This tribe, and that of the Yamood, which lies between them and the Caspian Sea, are subject to Persia, but their allegiance is unwilling. The Yamood tribe is said to contain 20,000 families. Four days were passed at this settlement ere they again set out; at length they cleared the valley of the Goor-

gan river, and debouched upon the plain eastward of the Caspian. To the left, the hills rose to a great height, clad to the summit with forest trees and foliage; to the right were extensive plains watered by the Atruk and Goorgan, and studded with innumerable encampments of Toorkmuns, with their flocks and herds; and in front were descried, in the distance, the lofty mountains of Elboorz. Lieutenant Burnes having now left the suite of the Khan, and journeying alone, avoided as much as possible all intercourse with the Yamoods, who are not so pacific as the Goklans; but passing down upon Astrabad, by the plain, after a march of eighty miles, arrived at that city. The Caspian, though upwards of twenty miles distant, could be faintly distinguished. The plague had the previous year devastated the town; half the shops and houses were shut from want of masters, and the whole population did not exceed 4000 souls. Astrabad, called the "City of the Plague," is a place of no great note; a dry ditch and a mud wall about two miles in circumference surround it. It is the birth place of the Kujurs, the reigning family of Persia. There are only four caravansaries, and but twelve shops for the sale of cloth; and, notwithstanding its favourable position, its trade is trifling. The magnificent causeway of Shah Abbas, which is still in tolerable repair, keeps open the communication with the provinces south of the Caspian; the trade with Orgunje, or Khiva, is comparatively trifling, there being but one or two annual caravans of eighty to a hundred camels, and scarcely any trade with Russia. It rains so much, that it is difficult to keep a mud wall standing, and the following ingenious plan has been devised to effect it. A mat of reeds is placed on the top of the wall, covered with earth, and planted with lilies, which grow up luxuriantly, and protect it from the rain. Though Astrabad is in the same parallel as Koochan, the thermometer, which there fell below the freezing point at sunrise last month, here stood at 60° in October. Astrabad produces the fruits of hot countries.

Lieutenant Burnes proceeded to the banks of the Caspian, at a straggling village called Nokunda, thirty miles from Astrabad, where he embarked, and sailed out to view its beautiful coasts: the vessels are all of Russian build; they carry two masts, and hoist square sails, but there were no vessels of any great tonnage. There is a belief that the waters on the southern side of the Caspian retire, and Lieutenant Burnes observed that, within these last twelve years, they have retired about 300 yards; he also corroborates the received opinion, that its level is below that of the sea. From Nokunda he proceeded to Ushruff, one of the favoured seats of Shah Abbas. All the fine buildings described by Hanway have been destroyed, though enough

remains to leave a favourable impression of the tastes of the Persian monarch. A mile beyond Ushruff, he found the great causeway barricaded, and a villager seated with a stick, to prevent a trespass; he was the *board of health* at Ushruff, and Lieutenant Burnes now learnt that the plague was raging at Saree, the very town he had intended that day to halt at. Two miles from the town, this information was confirmed, and, altering his plan, he took the high road to Tehran. Saree had suffered so severely from the plague in the preceding year, that there were not now more than 300 people in it. Mazenderan is a disagreeable country, and has so moist a climate, that the inhabitants are subject to fevers, agues, dropsies, palsies, and many other diseases; the people are sallow, and the children weak and rickety. It is a land of snakes and frogs; but the snakes are not venomous, being of the water species. So great is the moisture, that the rice crops are mowed down near the ear, and placed to dry on the stubble, otherwise it would rot. Mazenderan is, however, a rich province. The sugar-cane thrives, but they do not appear to prepare it beyond the first stage, and sell it as molasses. Cotton also grows luxuriantly, and silkworms are reared everywhere: the fruit is good, and much of it grows wild. The peasantry have a sickly appearance; the houses are buried in vegetation; creepers, melons, and pumpkins are seen resting on the roofs, and every house has its garden.

At the village of Aliabad, which is twelve miles from Balfurosh, they quitted the causeway of Shah Abbas, and proceeded south to the mountains, and entered the beautiful glen which is watered by the Tilar river; this valley extends for sixty miles, and is the greatest of the passes into Mazenderan. Shah Abbas cut a road in the rock for about ten miles, which is yet passable. They cleared the valley by the pass of Gudook, which leads up to the table-land of Persia; the ascent was continued and gradual, and at Feerozkoh, they were again 6000 feet above the sea. The sides of the pass were very precipitous, and the road narrow: it had formerly been fortified. This is the scene of romance, and of the strains of Firdoosee, the Persian Homer. Lieutenant Burnes thinks this pass of Gudook may be identified with the Pylæ Caspiæ; and it is a remarkable fact that, in the modern coinage of Mazenderan, that province is yet denominated *Taburistan*. The *Taburi* were attacked by Alexander in this neighbourhood. Feeroszkoh stands under a naked rock or fort about 300 feet high; it resembles Bameean, from the excavations in the hills, where the inhabitants keep their flocks also in the winter. The climate is severe, and the snow lies for five months in the year. They made three marches to Tehran, a distance of ninety miles,

halting by the way at the hovels of caravansaries, where the traveller lodges in the same room with his horse. The country was arid, bleak, and miserable, and the number of villages most limited. At noon, on the 21st of October, Lieutenant Burnes reached Tehran, the capital of the "King of Kings," and alighted at the house of the British envoy, by whom he was introduced to the Shah. His majesty, on hearing the account of his travels, was pleased to exclaim, in a tone of surprise, "Why, a *Persian* could not have done so much!"

On the 1st of November, Lieutenant Burnes quitted Tehran, and passing through Ispahan and Shiraz, visiting the tomb of Cyrus and the ruins of Persepolis, reached the coast at Bushire, whence he returned by a cruizer to Bombay, where he arrived on the 18th of January. A better summary of his travels cannot be given than in his own words. He had visited Bactria, Transoxiana, Scythia, and Parthia, Kharasm, Khorasan, and Iran; retraced the greater part of the route of the Macedonians; trodden the kingdoms of Porus and Taxiles; sailed on the Hydaspes; crossed the Indian Caucasus, and resided in the celebrated city of Balkh. He had beheld the scenes of Alexander's wars, of the rude and savage inroads of Jengis and Timour, as well as of the campaigns and revelries of Baber: in the journey to the coast he had marched on the very line of route by which Alexander had pursued Darius; whilst the voyage back to India took him on the coast of Mekran and the track of his admiral, Nearchus.

Mr. Burnes also adds to his Narrative three Supplementary Books, the nature of the information contained in which will be best indicated by inserting a table of their titles and contents.

I. *General and Geographical Memoir on Part of Central Asia.*

Account of the Kingdom of Bokhara—The River Oxus, or Amoo; with some notice of the Sea of Aral—On the Valley of the Oxus, &c.—On the reputed Descendants of Alexander the Great—On the Sources of the Indus—Notice of Yarkund, and its intercourse with Pekin, Bokhara, and Tibet—On the Mountains of Hindoo Koosh—Toorkmania, or the country of the Toorkmuns—On the Inroads of the Tartars, with a notice of the Tribes in Toorkistan—On the Horses of Toorkistan.

II. *Historical Sketch of the Countries between India and the Caspian Sea.*

The Punjab—Historical Sketch of Events in Afghanistan since the year 1809—Chiefship of Peshawur—Chiefship of Cabool—On the Affairs of Western Afghanistan—Summary on the Affairs of Cabool—On the Power of Koondooz—Sketch of the History of Bok-

hara—On the Political and Military Power of Bokhara—On the State of Khiva, or Orgunje—On the North-east Frontiers of Persia: the Koords and Toorkmuns.

III. *On the Commerce of Central Asia.*

On the Commercial Relations of the Punjab, and the Advantages of Opening the Indus—On the Commerce of Cabool—On the Commerce and Foreign Communications of Bokhara and Central Asia—Notice on the Trade of Persia.

IX.—*Narrative of a Passage from Bombay to England; describing the Author's Shipwreck in the Red Sea, and subsequent Journeys across the Nubian Desert.* By Captain W. Bourchier, R.N. London. 1834. 12mo. pp. 105.

THE author of this little volume was wrecked near the island and port of Suakin, on the western shore of the Red Sea, and returned to England *via* the Nile. He was thus led to cross its eastern desert by a route not, we believe, previously traversed by any English traveller; namely, from Suakin, in a direction nearly west, to Berber; and has thus added another itinerary to our previous knowledge of this district.

We shall first insert this itinerary as brought into a tabular view by Captain Bourchier himself, and then select a few of his accompanying details:—

Courses and Distances from Suakin to Berber.

Courses set by a pocket compass; the distances estimated by time.

Dates.	Courses.	Miles.	Hours.	Remarks.
Dec. 13,	W. by S.	13	6	Filled water-skins.
14,	West.	20	7½	Water in pools, scooped by the hand.
15,	S.W. by W. ½ W.	30	8	Well Ochock (good water).
16,	S.W. ½ W.	10	3¼	Bedouin encampment.
17,	W. by S.	23	7¼	Guide breaking camel.
18,	W. by S.	22	5½	Well Skidhee (water bad,
19,	W. by N.	25	8¾	[watered camels).
20,	W. by N. ½ N.	27	9¼	Rocks, Antelopes.
21,	W. by N. ½ N.	29	9¼	
22,	W. by N.	25	8¼	Well Al Bâk (uncertain in
23,	West.	32	9¼	Deep sand. [summer).
24,	West.	8	2¼	Reached Berber.
	Total	264	84½	

The road, on first leaving Suakin, is deep sand; but the whole of the third day's journey was laborious ascent. Afterwards, the country was diversified; and near the well Skidhee there was an

extensive patch of dhourra under cultivation, with numerous flocks of sheep and goats, and abundance of camels, pasturing near it. The dryness of the atmosphere was occasionally excessive, and distressing to bear; but the incidents of the journey generally were few. No alarms were received from robbers, or any other cause. The journey was performed on camels; the number of the party was fourteen.

Suakin is a sea-port of some note, and trades in particular with the opposite coast of Arabia. It is thus generally resorted to by pilgrims proceeding from the westward to Mecca. It is on an island not exceeding one-third of a mile in any of its dimensions; and is thus a small place, but populous. Berber is of greater magnitude and importance, but too well known to be here minutely described: it enjoys a considerable trade, chiefly in Surat piece-goods, sandal-wood, and perfumes, from the Red Sea; the returns for which are slaves and dates; and in elephants' teeth, wax, gold, and slaves, with Abyssinia. There is an indigo manufactory near the town, established ten years ago by Mahomet Ali; but the usual vice of his government is here, as elsewhere, observable—almost every branch of trade and agriculture being a close monopoly.

From Berber, the travellers proceeded along the Nile to Abu-Hamet, a journey of five days; whence they struck across the desert to Kroosko. This journey was more severe and fatiguing, both for men and horses, than that from Suakin to Berber: the sun being scorching by day, and the night-wind, though so cold as to be painful, was equally dry and withering. The route is known, yet we subjoin Captain Bourchier's itinerary of it, concluding with it this notice of his book. He seems to have undergone considerable danger and hardship, and to have supported both with the characteristic spirit and light-heartedness of a British seaman. But his means of adding to our exact knowledge of the countries he visited were necessarily small.

Courses and Distances from Abu Hamet to Kroosko.

Dates.	Courses.	Miles.	Hours.		Remarks.
Jan. 3,	N. N. W.	24	8		
4,	N. N. W.	5	1	40	
4,	N. by W.	21	7	30	
5,	N. by W.	26	9	10	
6,	N. by W.	27	9	15	Well Murat.
7,	N. by W.	22	8		
8,	N. by W. ½ W.	28	9		
9,	N. N. W.	13	4	33	
9,	N. by W.	15	4	35	
10,	N. by W.	38	11	20	At Kroosko.
	Total miles	219	73	0	

X.—*The London Atlas of Universal Geography.* By John Arrowsmith. 50 sheets. London. 1834.

We can now announce the publication of this work, the appearance of which has been delayed on motives very creditable to the author's zeal, but yet too long delayed, on any motives, after it was first promised. In his anxiety to incorporate in his sheets the very latest information to be procured anywhere, Mr. Arrowsmith overlooked the fact, that the science which he illustrates is progressive, and that no moment is likely soon to arrive at which new matter will not be flowing in.

The zeal, however, which has delayed the publication has unquestionably added to its value. In a Letter which he has addressed to the Royal Geographical Society, Mr. Arrowsmith points out especially considerable improvements in the Map of Ireland, and in those respectively relating to Asia, Africa, and South America; and although it would have been more satisfactory if, with his mere statement of these, he had indicated in detail the sources from which he has drawn his emendations, and the principles on which, on each occasion, he has exercised a critical judgment, and weighed conflicting statements—(in which case we should have felt it due to him to publish his letter *verbatim*) yet, knowing, as we do, personally, that he has had many exclusive advantages, and has diligently profited by them, it appears not less due to the public to give this, our knowledge, currency.

The Atlas consists of fifty sheets, of which many favourable specimens might be given, besides those above indicated. Some objection may be made, at first sight, to the little prominence given in most of them to physical geography: and we confess, ourselves, that we think a superior richness might have been given to this portion of the engraving, without injury to the clearness of the topographical detail; yet, substantially, the fault is more apparent than real. The physical characters of each country are not so much wanting, as much kept down; and the best judges of maps strongly object to any approach in them to heavy engraving.

The work, as a whole, is a most acceptable present to the geographical public; and its convenient size, combined with its pretensions to minute accuracy, enhances its value. To those who have frequent occasion to consult maps, nothing is more irksome than a very large sheet—unless it be a meagre or incorrect one.

MISCELLANEOUS.

I.—*Memoir on the Warow Land of British Guiana.* By William Hillhouse, Esq., Corresponding Member R. G. S. L. Reprinted from the "Guiana Chronicle."

[The Warow Country is the flat alluvial coast between the mouths of the Pomeroon and Oroonoko.]

The alluvial deposit of the province of Guiana, extending from the river Amazon, Maranon, or *Marun y abba** (which last is the proper name, signifying the river of maran trees, or balsam of copaiba) to the Oronoque, presents on a magnificent scale a natural phenomenon which the geologist, and the general student of nature, will find the greatest interest in investigating. To pursue this inquiry with accuracy, it will be necessary, in the first place, to understand the geographical and geological position of the province of Guiana,—bounded by the sea on the north-east, by the Amazon on the south, the Oronoque on the north and north-west, and insulated on the south-west by the junction of the Cassiquiare with the Rio Negro. I feel a total inadequacy to this task, unenlightened as I am by the science of the great American traveller, whose researches were confined to the south and west extremities of the province, leaving the northern parts so undescribed to Europe, that even the British legislature has not known in its enactments whether its richest possession was continental or insular.

Extending south-east and north-west, is a central granitic ridge, unbroken except by the river Massarony, which circumscribes one of its western forks; to the north of this descend the rivers from the Oronoque to the mouth of the Amazon, carrying on to the sea the miscible particles of granitic decomposition, and incorporating with them in the passage the vegetable depositions of an immense tract of uninterrupted forest. The general tint of these waters is a coffee colour, but many of their tributaries, by flowing through valleys of a whitish grey clay, become transiently turbid; the Cuyuny is at its mouth considerably whiter than the Massarony, and the line dividing the two waters is apparent for some miles after their junction. At the Post in Massarony the water on the Cuyuny side of the stream is much inferior in quality to the opposite; there are shrimps and small lobsters in it, and the fish are to a connoisseur inferior in firmness and flavour. The Cuyuny is crossed by large veins of clay, to which the Indians resort from

* The Indian nomenclature of places and rivers has always reference to some peculiar natural production there abundant.

great distances, for the manufactory of their cooking utensils, from its superior fire-proof qualifications, and which occasion its milky tinge. The black waters are tinted by the iron of the granite rocks, and, at their very source, are as dark as in any stage of their course: this is the true theory of the black and white waters.

After stating this much, I am at a loss how, by the common rule, to account for the formation of the alluvium; because, at thirty or forty miles from the sea, *all* the rivers are perfectly transparent, and do not afterwards become turbid, but by the ingress of the tide from the sea; upon contact with this they become impregnated with mud, till at the mouth and for several miles out at sea, the whole waters of the coast are of a dirty cream colour.

How a congregation of perfectly transparent streams should form such a deposition as the alluvium of Guiana is to me inexplicable, particularly as it is proved by Major Staple, in boring for fresh water, that this alluvium is upwards of 120 feet in perpendicular depth*.

The deposition on the coast is a strong blue clay, highly impregnated with marine and vegetable salt, and vegetable matter in the finest state of comminution; and is frequently intersected by strata of sand and beds of small shells—fragments of which are found in the general mass; but the living animals, of which these shells were the tenements, are not found nearer the coast than the blue water or deep sea. A consideration of this latter fact has induced me to hazard the supposition that the alluvium has a compound origin, deriving its fertile principle from the waters of the interior, but its basis from large veins of clay on the coast, disturbed and dissolved by the winds and waves, and finally deposited on the line of coast at the extreme *leeward* verge of the sea. This is not the precise definition of the term alluvium, but it is as near an approximation to it as the formation of British Guiana will allow. There can be no doubt that the great rivers deposit to a certain extent; but as veins of clay are as frequent at sea as on land, it is even probable that their solution has produced the great basin of ocean itself, and the action of deep currents below has caused the deposition on the margin above.

The most cursory view of such a formation, combining at once all the fertilizing principles of earth and sea, will convince both naturalist and agriculturist that millions invested in its cultivation were more certain in their profits than if spent on mines of gold. British capital has, in fact, doubled itself in every ten years, and in many instances in five.

* It is, however, observable, that in proportion to the depth the proportion of vegetable matter decreases, till at near the sub-stratum of micaceous sand, it is pipe-clay, without any vegetable admixture. This is another fact in favour of the existence of veins of clay on the coast, which are *not* alluvium, but agents in its production.

The whole surface of the coast lands of British Guiana is on a level with the high water of the sea. When these lands are drained, banked, and cultivated, they consolidate and become fully a foot below it. It requires, therefore, unremitting attention to the dams and sluices to keep out the sea, one inundation of which destroys a sugar estate for eighteen months, and a coffee one for six years. The original cost of damming and cultivating is fully paid by the first crop, and the duration of the crops is from thirty to fifty years; so that though great capital is required for the first outlay, the comparative expense of cultivation is a mere trifle, compared with that of the islands, though the expense of works, buildings, and machinery may be treble or quadruple, being built on an adequate scale for half a century of certain production. This is the true reason of the great original outlay in Demerara; which has been encouraged by the merchant from motives of clear-sighted economy and interest, and those who have asserted the contrary have betrayed an ignorance of causes, as well as an inexperience of consequences, by attributing it to the extravagance of the planters. In no part of the interior that I have ever seen could cultivation be carried on so as to command an equal rate of production for less than five times the expense of that of the coast.

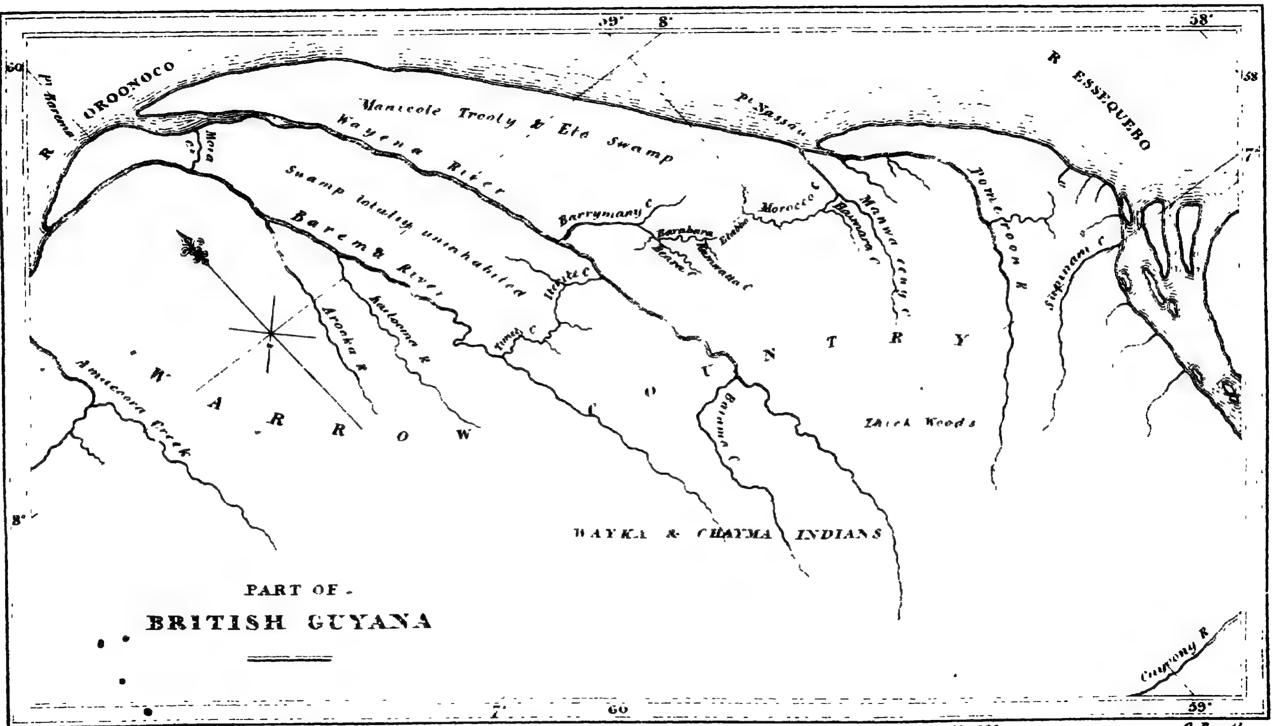
I have thought it necessary to insert these remarks, as an antidote to the hasty assertions of casual and superficial observers, who have imagined that the grand and complicated scale on which cultivation is carried on in British Guiana is the result either of pride in the display of means, or of avarice in the speedy acquisition of wealth. The SYSTEM is one of necessity, dictated by every principle of economy and humanity. It has enabled proprietors to increase the comforts of their dependants on a scale unprecedented elsewhere; and when it ceases, the population must of course descend to a state of starving pauperism. I state this without any reference to former or future events, but as the result of a conviction which is in every instance founded on fact and direct personal experience.

There is considerable difference in the rise of tides on the coast; at Demerara it is from eight to ten feet, at Pomeroon from six to eight, and at the Wayena scarcely more than four feet; this decrease is undoubtedly owing to the constant falling of the Oronoque, the bulk of whose waters, flowing to the ocean, retard those of the coast. Sluices for the cultivation of land here should therefore be of greater proportionable width than is required to windward; and I much doubt whether coffee would thrive with such shallow drainage. My latest experience has convinced me that, from the Pomeroon to the Oronoque, no permanent drainage can be effected but by the agency of steam: any settlement of free labourers in this tract is therefore totally impracticable.

I come now to the description of what is called the Warow Country, extending from the Pomeroon river to the Oronoque coastwise, and from the coast, twenty or thirty miles into the interior. Its first feature is the Morocco creek. The debouchure of this creek is about five miles north-west of the Pomeroon river. Proceeding upwards to the south, in about ten miles it receives the Manwareeny creek, whose general course is to the north: from this point the Morocco creek verges west by north; and in less than half a mile, it receives the Hamaira Cabara, whose course is from the south-west: hence the creek proceeds about west by the north till it reaches a small creek called the Para; when it forms nearly a semicircle, going first south, then west, and latterly north, through the Savanna to its source.

To the junction of the Manwareeny, the banks of the creeks are for the most part drowned land; the south bank being slightly elevated—the north bank a vast flooded savannah. At the Para creek commences a succession of sand-reefs at irregular distances, for the most part parallel with the coast and at various heights, from five to thirty feet. On these reefs are situated many Indian villages—Warows, Arawacks, and Spanish Indians, refugees from the missions of the Main. Of the original formation of these reefs it would be irrelevant to form any conjecture. They are composed of sand, clay, and fragments of stone or gravel, of burnt clay, silex, and iron ore, no doubt the product of the dreadful conflagrations with which this coast has so often been visited.* The intermediate valleys or swamps present evident vestiges of the same fires, in the charred trunks of trees at the surface and at various depths. The alluvial formation in these swamps is for the most part on a lower level than that of the immediate coast, but its deficiency is supplied by immense masses of semi-decayed vegetable matter, called *pegas*, to the depth of from five to fifteen feet. This addition raises the level considerably above that of the sea, and cultivation might undoubtedly be carried on here, as in the canals of Demerara, but requiring the same outlay of capital. The reefs can be settled piece-meal, and are accordingly occupied by a population of Indians more dense than in any other part of the colony, being of very superior fertility to any other extra-alluvial tracts. The savannahs of this district present greater natural facilities for the cultivation of rice than any I have ever beheld: the miasmatic swamps of Mobile and Apalachi are not to be com-

* Fires in the forests occur at intervals, after a long accumulation of vegetable relics on the surface. A succession of dry seasons gives this superstructure the combustibility of tinder, and the least spark communicated involves the whole district in conflagration. These fires generally spread from river to river, and leave the soil, especially if clay, for many years sterile. The whole coast of Pomeroon, and that of Mahaicony and Abary, have suffered thus within the last half century.


R OROONOCO
Pt Barema
Mora Ct
Manicole Treoly & Eta Swamp
Wayena River
Swamp totally uninhabited
Barema River
Arooka R
Kaitooma R
Pt Nassau
R ESSEQUEBO
Barrymany C
Morocco C
Manwa ceny C
Pomeroon R
Supinaam C
Batama C
Thick Woods
Ameecoora Creek
WARROW COUNTRY
WAYKA & CHAYMA INDIANS
Cuyony R
PART OF
BRITISH GUYANA
Published for the Journal of the Royal Geographical Society by John Murray Albemarle St 1834
C Bradbury

pared with them; but this cultivation requires a capital and a system like that of sugar, and cannot now be undertaken. I hazard this assumption on the supposition that a crop of rice can be taken off in four months; otherwise, being under water for seven or eight months in the year, that and every other cultivation is utterly impracticable.

At the western extremity of the detour of the Morocco is a large savannah, through which runs one of those extraordinary canals without current, which, on a smaller scale, like the Cassiquiare, joins two rivers, and insulates the coast lands from the Morocco to the Wayena. These canals are called *Etabbo,* from Eta (*Mauritia*), and Abbo, a water course, being generally found in large swamps of mauritias, which is the case with this one: the verge of this savannah being so exclusively surrounded by *Eta bush,* that scarcely another tree is to be recognised. Here I have seen, at the top of a decayed eta,* the nest of the tropical musk duck, which we improperly call Muscovy, with the parents bringing singly, from a height of seventy or eighty feet, their newly-hatched progeny to their natural element beneath; they appeared to lay hold of the duckling with the bill by the neck, and in five minutes the removal of fourteen was effected. I was on the spot directly, but after an hour's hunt, with several hands, not one could be taken, the young, though for the first time, diving fifty feet at a stretch, and hiding in the grass so as to defy pursuit—such is instinct.

The Etabbo is about eight feet wide and four deep, but in the dry seasons much less, as loaded canoes cannot then pass. It is an incalculable blessing to the Indians of the Morocco, being a natural internal navigation, which secures to them the fisheries both of the Wayena and Oronoque; from hence through the Kamwatta,† Barrabarra, Beara, and Barrymany creeks, twenty hours' pull brings them to the lagunes of the Wayena, of which I shall shortly speak.

The Beara and Barrymany creeks are bordered exclusively by the manicole palm, overtopped by high trees of the Mora. The Wayena, for several miles below and above the junction of the Barrymany is trooly (tectoreum), of such luxuriant growth, that I have seen leaves nearly thirty feet long by three broad, without a flaw or interstice; this is truly a most magnificent thatch for houses. Below the region of the troolies commences the cacateery, a kind

* The musk, and all the varieties of the vicissi or whistling duck, perch and roost on trees: the musk duck is domesticated; but I have not known the vicissi to breed in that state. The tame hefa, or musk duck, is inferior to the wild in flavour, being more coarse and musky: it varies in colour; that of the wild being uniformly a blue black with a white spot on the wings. The tame drake has twice as much bare flesh on the head as the wild.

† Kamwatta, the native bamboo.

of mangrove, and immediately at the verge of the sea, the coorida, so that each variety of palm and aquatic trees appears to have a distinct region. In July, 1824, I traversed this route, and again the ensuing year. The manicole was then bearing ripe fruit, like a small black cherry, and the Beara and Barrymany creeks presented the most lively spectacle that could be imagined; innumerable flocks of every variety of the parrot tribe, cooloos, maroodys, powis, and monkeys, kept up such an incessant chattering and screaming, that a large English rookery was but a feeble comparison. The young of all birds are at this season just fledged, and it is worth while to travel in the rainy season with a tent in the corial of trooly leaves, for the pleasure of two or three days' such shooting as beats all the battues of Europe. I am a bad shot, but I managed every morning, between seven and ten, without leaving the corial, to bag twenty or thirty head of the above varieties: the large blue and yellow macaw being the most numerous, and crossing the creek within pistol-shot in all directions. As a hint to gourmands, macaw soup is similar, and I think equal, to hare; and that of parrots, at this season when remarkably fat, is also excellent. The powis is like turkey, with a game flavour, and the cooloos and maroody are decidedly *better* than the pheasant of Europe. My canoe carried eighteen men and five women. I had a large circular iron plate, used for baking cassada, a-midships; and on this a fire, "which always burned," well loaded with soups, stews, and pepper-pots. I had eight fowling-pieces on board, but two would have been sufficient for the supply of double our crew.

On leaving the Barrymany, and entering the Wayena, here about two hundred yards broad, the scene changes at once. No more manicoles, nor feeders thereon; but now and then a flock of vicissi ducks or a pair of hefas. By sending a small craft in advance, on one side of the river, and following slowly in the canoe on the other, I managed to decimate at least every passing flock, procuring a most delectable change of diet; the vicissi duck being, without exception, the most superb viand of any part of the world.

Ascending the Wayena a few miles, on the west is the Iterité* creek, which communicates by an etabbo with the upper Barema. In the lower lagune, the Mora passage, large enough for schooners, again joins, so that the space between the two rivers is twice insulated. I proceeded up the Iterité creek, and took up my rest in a Warow town or village.

He whose tastes are indiscriminate, like those of the hog—who will not thank his Creator, by preferring the clean to the unclean—who is no disciple of either Somerville or Izaak Walton—has no

* Pronounced Etereety—a long reed, with a tuft of leaves at the top. The bark is split into strips, and wove into various kinds of baskets, called quakes and pegals.

business to travel, at least in Guiana. A man should here have his animal and mental perceptions equally in a state of alert excitement; he will otherwise lose all the pleasure and most of the profit of travel. Hunting, shooting, and fishing open the museum of nature; and a discriminating palate will visit that museum often. Another qualification is indispensable—a ready pencil in water-colours; this saves the annoyance and expense of a companion, and the pencil is a faithful and credible witness, without which the pen is too often held as the mere tool of travellers' stories. It is my firm belief that no man can narrate an intelligible and faithful description of any object in nature, except he can also make a faithful drawing of it. Let Walter Scott describe the Trosachs, and let the best artist paint from his description—what likeness shall we find to the real scene?

This is a prelude to a rough but faithful etching of a Warow village; not one " suspended from the tops of trees," but built in and with eta trees; and which will sufficiently explain the erroneous description of Humboldt.

The *Mauritia* grow in clusters as thick as trees can grow; the Warow selects one of these groves, and fells the trees about four feet from the surface, on their stumps he lays a floor of the split trunks; the troolies are generally adjacent for the roof, but if not, the eta leaf serves; lumps of clay are laid on the floor, on which fires are made, which at night illuminate the tops of the adjacent trees, as if they were actually inhabited; but the habitation is an irregular hut, raised on a platform just above the level of the water, which in these regions is three feet above the earth for three-fourths of the year. Some of them can contain 150 people. Their duration is coeval with the supply of aroo*, or eta starch, or the completion of the formation of a corial or canoe. When an eta tree begins to fructify, it is cut down, a large slice is cut off one side, and the stringy substance of the interior is cut into shreds, the remainder of the trunk serving as a trough, in which it is triturated with water, by which is disengaged a considerable quantity of starch; the fibrous particles are then extracted, and the sediment or aroo formed into moulds like bricks. This is spread out, on stones or iron plates, over the fire, and makes a very nutritive, but at the same time most immasticable bread—it must be unavoidably bolted, being so very viscous that chewing absolutely locks the jaw; it is, nevertheless, excellent to thicken soup, and is a general specific for diarrhœas and dysenteries, which in these aquatic regions are the prevailing diseases.

In the green part of the trunk, a beetle of about an inch and a

* Aroo—starch; aroo aroo (arrow-root)—starch of starch, that root growing the greatest proportion of all known vegetables.

half long, with a long snout, which lays its eggs, and in about a fortnight grubs,* about the size of the two first joints of the forefinger, makes its appearance. These are a favourite fry both of the Warows and the creoles; they are scarcely distinguishable from beef marrow.

There is no want of fish, particularly the creek varieties of the *Silurus*;† so that the Warows have all the necessaries of life without in any one instance cultivating the soil in this region. Those settlements of them at the heads of creeks, where the land is firm and dry, cultivate the cassada, &c. as the other tribes; but the *biscĕ* tree, of which their canoes and corials are constructed, does not grow, except here and there on the detached reefs in the eta swamps; and here, therefore, they are obliged to reside for the purpose of forming craft, by the sale of which they supply themselves with axes, knives, fish-hooks, iron pots, small looking-glasses, &c.; such articles of British manufacture having found their way even to the most uncivilized recesses of the forest.

The Warows do not differ in their general habits from the other coast tribes: they are dirty in their persons, and, in point of intellect, are much despised by others; but they are certainly more industrious, and the skill with which they fashion a canoe for fifty people, on the most perfect model of speed and sea-worthiness, is a proof that they have at least one available talent. They furnish the whole colony with small craft, which for cheapness and durability far exceed any European production. I gave ten pounds sterling for a bisce canoe, 40 feet long, 6 broad, and 3 deep in the centre: she carried with ease twenty-five hands and baggage, and two months' *materiel*; she passed four times over all the falls of the Massaroony; went twice through the Pomeroon rollers to the Oronoque; was hauled over rocks, sands, and portages, and lasted ten years without a patch. No European craft, at three times the cost, will stand, in this climate, one-third of this wear; and they must be housed, constantly repaired, painted, and are always leaky. I bought several of these craft in the Iterité, where a depôt of them had been collected, and by selling them at about cent. per cent. in Georgetown, cleared the expense of my expedition. But the bargaining, except as an instance of national manners, was sufficiently tedious. First came a multiplicity of questions, then a jorum of beer, made of the fermented fruit of the eta, acid, astringent, and a red oil floating at top; this being returned by a glass of rum, the trading treaty was concluded. Then

* Otöokooma.

† 1. Himeer;— 2 cassy—3. lowkíddy—4. dawalla—all *Siluri*; besides yarow, hoory, haimara, lucananny, waboory, weycou, hoocooroo, &c., drawings and descriptions of which, with many other fruits of my labours in this country, are in the Bristol Museum.

came complaints against the Spaniards* for taking away all their largest craft, leaving them nothing but such small ones as lay round the house, one of which, for eight or ten people, I bought for four axes. This I found was, however, only the basis of the bargain—a cutlass, a knife, paper of hooks, scissors, needles, pins, a razor, beads, and five yards of salempores, being understood as all included in the term four axes.

This was a mere feeler; as soon as the old chief or captain saw the complexion of my wares, and that I bled freely, five or six other craft gradually made their appearance, which I bought reasonably enough; and then was proclaimed a general dance. This was merely stamping round in a ring, to a simple monotonous song by the women, accompanied by beating on a monochord, being the skin of the arm of an eta leaf, raised by a bridge from the pith, not quite so musical as Paganini's. A few bottles of rum, very much diluted, raised their spirits far higher than I had calculated on, and many regular rows and fights were the consequence, which were summarily settled by the captain ejecting all the belligerents into the surrounding water. I observed this to succeed admirably, as they clambered up into the house again as cool as cucumbers, and as good friends as ever; I recommend the plan to all masters of ceremonies. The ball dress for the occasion was, for the men, divers figures of red paint on the face, red hands and feet, and a cord round the middle, to which was attached a salempore lap of the smallest possible dimensions. The women had a like cord with a piece of the bark of the cacarally beat soft, and fastened fore and aft, so as to be a very inefficient substitute for mother Eve's fig-leaves. I left this Mauritian Almack's early in the morning, and, after a tedious passage, got into the Timity creek, and thence into the Barema river. Both banks of this river to near the mouth are a trooly swamp, intermixed with maricoles, moras, and a variety of aquatic trees. I observed floating on the surface of the water a plant, exactly the shape of a full-blown rose, but green and six inches in diameter. I could not find one in blossom; though its roots are absolutely unconnected with bottom or shore, not one was to be observed after the water became brackish, nor washed out at the mouth; it is a peculiar plant, both in habit and locality. Future botanists can classify the water rose of the Barema. The guns had rested for the last few days; they were now to do double duty. Macaws of three different varieties; parrots innumerable; the greater and less powis; three varieties of the maroody, with vicissi and hefas, and, by way of variety, fish-shooting with arrows.

* The Spaniards, when they hear of any very large craft on the stocks, send a party of men who pay the Indians some small sum for their labour, and cut the craft in pieces. This is done to prevent smuggling and piracy, the only trades of the free people at the mouth of the Oronoque.

The rary-mayu, a variety of silurus, growing to a large size, in a sunny day rises to the surface between eleven and one o'clock, and its long dorsal spine may be seen standing out of the water in the mid stream. On seeing this, all hands are hushed as death, and the strongest and best shot goes forward with his bow and largest fish arrow, the rest paddling softly on to within certain bow-shot. On the delivery of the arrow, the fish dives, the craft pulls to the middle, then stops, and all eyes are directed to all points, till one detects the arrow-feather appearing, though but for an instant, above the surface; away we go to that spot, which is scarce reached than the feather makes a second appearance, then a third, and so on, till the fish becomes fatigued, and allows the corial to get near enough for a second shot; down he goes again, and plays the same game, but with reduced means. I never felt greater excitement than at my first hunt of a rari-mayu, which took three arrows and nearly half an hour to kill; he weighed nearly ninety pounds. Though not a firm, it is a well-tasted fish. In this chase, if the first rising of the arrow is not seen, it is ten to one if the fish is taken; he will get out of sight and rub out the arrow against the bottom or tree-roots at the sides.

In this river is found the maricotto and the palometo—the one a larger and the other a smaller individual of the pacou family—both very rich fish, and not found in any of the rivers between this and the Amazon. The small red brown maroody is also peculiar here; and the tri-coloured carrion crow, or king vulture, entirely supersedes the common black carrion crow of Demerara. Appropriate localities are strongly marked in Guiana; the small and long-tailed agouti, or adoory, is not found west of the Essequebo; the white-headed maroody, or cooloo, is not found east of the Wayena; the small powis, and the small brown maroody, are not found east of the Pomeroon. The cowanaru, or superb coq de roche, is a native of the central granitic chain, and the great rivers rising in this chain are those which alone produce the pacou, and its vegetable aliment the weya.

Between the Timity and the mouth, two large creeks join from the west, the Kaitooma and the Arooka; just below the last, a hill of about 150 feet high is visible from the river, between which and the mouth the Mora passage on the eastern bank connects it with the lowest lagune of the Wayena. Point Barema is laid down in the Dutch charts as a boundary point from whence a S. W. line separates Spanish from what is now British Guiana. The Spaniards have always claimed territory east of this line, but never attempted any settlement. During the royal monopoly it was a great object with them to extend their jurisdiction as far to the eastward as possible, for the prevention of smuggling, which was then carried on upon a large scale. Since that period, the opening of the ports has done away with the contraband traffic, and the

land between Barema and Wayena being uninhabited and uninhabitable, is not worth the possession of either party. The Dutch drew in their posts from the Barema to the Morocco reefs, then to the mouth, and then to the Pomeroon. The Spaniards once attacked the post at Morocco mouth, and were cut off to a man, which is the only warfare known on this territorial boundary.

The Barema river is a mere creek of the Oronoque, and ought to be the boundary. From its mouth, the Oronoque has an appearance similar to the Delta of the Essequebo. The only particular worth remark is, that the Amacoqra creek, which is some miles west of the Barema, is in all charts that I have seen placed several miles to the eastward of the Wayena river,—at least twenty miles out of its proper place.

On returning, I proceeded through the Mora creek into the lagunes of the Wayena; these are three enlargements of the river into lakes, the lowest the largest, with intermediate contractions, the western shores being shallow mud flats; and here the Spanish Indians of the Morocco resort to fish for querryman, a variety of the salmon about two feet long, which salts admirably and is the staple of their subsistence. They are caught with casting nets, cleaned and salted on the spot, and then rapidly conveyed to the creek, where they are dried in the sun. When enough is collected to make a cargo, a large canoe is freighted for the coast and town, where a ready sale is got at a guilder per fish, and the proceeds are expended in necessaries.

The Wayena, at about twelve miles above the Barrymany, is joined, on the west, by a large creek called the Barama, which nearly equally divides in its course the space between the Wayena and the Barema. Here rising ground commences, and both branches assume the ordinary appearance of streams in the granitic region. There are trifling rapids in the Wayena, which are obliterated in the wet season. Both branches are inhabited by a tribe of Accaways called Chayma, and a few Arawaaks. The coast from Pomeroon to the Wayena, as laid down in all maps, is totally imaginary. In running down, I observed no promontories and no creeks. The Indians state that there are none, but an uninterrupted north-west line, with a low mud flat in front far out at sea, and in some places spits of sand on which are rollers. There are twelve feet water on the bar of the Wayena, and the deep water is on the east shore. The Spaniards state that the water on the bar varies from ten to sixteen feet at different seasons, which must be from the influx of drift mud, a common circumstance on this coast, where I have seen a canal eight feet deep filled in one tide.

It will be evident, on a review of this immense tract, that though it be for the most part uninhabitable for the industrious and agriculturist, it is a snug retreat for the pirate and the smuggler; in

fact, the lagunes of the Wayena are admirably adapted for either of these professions, and have in several known instances been so used. A vessel drawing twelve feet water, lying under the windward shore, cannot be seen from the offing; and here any cargo can be disposed of piecemeal either to Oronoque or Demerara. The obvious policy of both the Governments, therefore, is to keep a sharp look-out in this direction, and the eye of the Indian is the only one that can be used on the occasion. The constant visitation of the spot for the querryman fishery brings it under his immediate observation, and no pirate or smuggler could be there without his knowledge. As to his communicating such knowledge to the Government, it never can be expected without an adequate inducement, for smuggling is no crime with the Indian who has no sovereign, and piracy is only on the water the trade of the Caribisce on land. The question, therefore, becomes simply this: Shall a colony of pirates be founded in this quarter, by neglect—or an out-post of police for its prevention, by civilizing its present inhabitants?

The territorial possession of this tract is thus a point of consideration with us, since if both the Spaniards and ourselves relinquish the jurisdiction, it is open as a neutral country to all adventurers, and the commerce of the neighbouring colonies will be exposed to great hazard. There is already apparent a great predisposition amongst the free people to *squat* in the Morocco creek, greatly to the annoyance of the Indians, who will be ultimately obliged to remove from thence, if the Government take no means of prevention. Here all public duties and local authorities can be easily evaded, and it will then become an Alsatia, or a similar establishment to that of Baratara in the gulf of Florida; with this difference, that, if once formed, it will be almost impossible to root it out.

WILLIAM HILHOUSE.

[NOTE.—The above paper was shown, previous to its publication, to Dr. Hancock of Demerara, who has favoured the Journal with the following Note regarding it:—"I differ from Mr. Hilhouse entirely as to his views regarding the superior *net* productiveness of the Guiana system of tillage; and his theory both of the colour of the rivers in that country, and the formation of its alluvial shores, seems to me also erroneous. But his account of the Warow country is very exact and valuable, particularly where he describes the inhabitants, whose close resemblance to the littoral or coast tribes of the Marañon, in Brazil, no one, I believe, has noticed. They are the same in physiognomy and manners; and their respective languages also resemble each other in sound and form, differing in both from the dialects of all the other tribes. Their idiom is more simple, perhaps, than that of any other human beings; they have a peculiar rattle and clatter in

their speech, and their words abound in the letters *n* and *e*, as in *nane-mane*, *naho*, &c.—peculiarities in which we are surprised to find a resemblance among tribes geographically so distant, and possessing no written character. These tribes have both also the spread in the foot, or duck's foot, as we used to call it in the Pomeroon, *i. e.* their feet and toes are spread out in the manner most suitable for walking on the muddy shores and marshes which they inhabit."]

II.—*Extract from a Private Letter addressed to Captain Sabine, R.A., F.R.S., by Mr. David Douglas, F.L.S.* Dated Woahoo (Sandwich Islands), 3d of May, 1834.

I ARRIVED in Byron's Bay on the 2d of January of the present year, and took up my abode with the Rev. James Goodrich, an American missionary, from whom I have received great kindness. I have since made successive journeys to the summits of the mountains and volcanoes—my first being to Mowna Kaah, my second to Kiraueah, and my third to Mowna Roa. I shall give you a short account of each.

1. Mowna Kaah, or the White Mountain, ascends gently at first, being skirted, near Byron's Bay (in lat. 19° 44′ N.), and itself by much the most beautiful and fertile district in this group, by a belt of about four miles breadth, chiefly cultivated, and in which may be seen the bread-fruit (*Atrocarpus incisa*), banana, sugar-cane, taro (*Arum esculentum*), and other plants used in the domestic economy of the islanders, in great profusion and luxuriance. This region terminates 1500 feet above the level of the sea; then commences a densely-wooded country, principally covered with several species of acacias, which attain a great size, and of which the native canoes are made. The underwood and brush is tree-fern, from four to forty feet high, and clothed to the top with an almost endless variety of other ferns. This region extends to 8700 feet above the sea, and being either bathed in fog or refreshed with daily showers, nothing can possibly be more cheering to the eye than to see in it immense feathery fronds of ferns decorating the indescribably rugged lava, which, from time immemorial, has been vomited down the flanks of these extraordinary mountains. A small path led through this wood, but in consequence of the late rains it was very bad, and the creeks were high and dangerous to cross. The upper edge of the wood does not terminate gradually, with a decrease in the number, or diminution in the size of, the trees, as is generally the case, but is cut off abruptly, the timber on the very summit being as large as in any part of the section. The slope of this region is also gradual, the travelling distance to its extremity being twenty-

seven miles. This afforded me a splendid collection of plants, chiefly ferns.

From this point to the height of 12,000 feet, the flanks of the mountain are broken into deep chasms, ravines, and numerous small extinct craters. I did not find a link of cryptogamous plants between the gramineous region and that where verdure ceases, as on the mountains of America and Europe; on the contrary, a small species of *vaccinium*, a singular plant belonging to the great order of *compositæ*, and a small alpine *juncus*, were the last traces of vegetation that I observed. The whole mountain is here of volcanic origin, differing in compactness, form, and colour, having no trace of primitive formation, or vestige of organic remains; and 12,700 feet high, a vast elevated table-land, or plain, is spread out, covered with sand, gravel, and stones, with scoriæ and ashes, to the depth of several feet; above which rise eleven peaks or humps, on the most elevated of which, a ridge of 221 yards in length, I placed my instruments, near a cairn of lava, formed, I judge from the decayed state of the lava, many years ago. My apparatus consisted of a reflecting circle, a large instrument for determining the dip of the magnetic needle, apparatus for intensity, a mountain barometer, hygrometers, thermometers, &c. I refer you for particulars to the accompanying register of observations; and as the weather was clear, and all care was taken, I am persuaded that they merit confidence. The wind was violent, but very steady, S. 75° W.; and through the kindness of Mr. Goodrich I was enabled to have simultaneous observations taken at his house.

The slope of the highest ridge is 52°. The south and east part is composed of ashes, which makes it very laborious to ascend; the north end is less steep, and the footing is surer on the large blocks of lava. All the peaks may be ascended, excepting one, which has a slope of 73°, and an elevation above the plain of 700 feet. At the foot of Station Peak, 1100 feet from the extreme summit, there was a conflicting commotion in the clouds, layers of air moving in every direction, and the wind ascending in whirls. This altitude appeared to be the greatest where the north-east trade-wind is felt. The thermometer, at 4 P.M., stood at it at 39°; dew point, 14°. In ascending the mountain, we found the hygrometer sink very regularly with the thermometer, to the height of 11,000 feet, and then it fell rapidly. The immense difference at the summit instantly caught my attention; and fearful lest the ether might have been applied too copiously to the ball, I repeated the experiment five times, with always the same result. So delicate was the dew-ring seen, that it appeared like an exceedingly fine grey silk thread; yet the moment of its appearance was readily perceived, and it continued thus visible from 4′ to 4′ 4″. The

instant of its disappearance, the mercury in the internal thermometer rose, as by a jet, from 3° to 3° 5′, and then gradually descended to within 2° of the external one. A very delicate thermometer, by Newman, which was compared at the Royal Observatory, and also at the Royal Society, and found to have no index error, when placed in a perforated tin cylinder, and suspended four feet from the ground, stood at 32°; while another, which in like circumstances invariably corresponded with this, when exposed naked in the shade to the wind, stood at 32° 5′. In a beautiful horizon of mercury without a roof, by a very satisfactory observation of the sun's meridian altitude, taken with a sextant having an index error of + 0′ 4″, the latitude was found to be (employing Young's refraction) 19° 49′ 58″ N.; and by a series of observations taken before and after noon, with a reflecting circle 19° 50′ 3″ N.: mean, 19° 50′ N. It is of great importance to know the exact position of the culminating points in these islands: the longitude I cannot deduce, for want of an almanac.

This extraordinary mountain does not reach the limit of perpetual snow, though snow, even to deepness, is occasionally seen in July and August. On the 12th of January this year, there was no covering of snow, and only a little lay here and there, on the northern blocks of lava on the extreme summit of the mountain. The total absence of verdure for about two thousand feet, the heating material of the lava, its insular position in the midst of the ocean, and its being acted on almost constantly by atmospheric currents, all probably raise the snow line; and perhaps the mean temperature may be at present further raised by the volcanic agency which is ravaging the whole island.

Sound is but very slightly diminished at the summit of Mowna Kaah, owing, undoubtedly, to the absence of snow. On the mountains of North America, at a much less elevation, where snow is abundant, the firing of a gun is not heard at a short distance even by the timid antelope or mountain sheep, especially if snow is actually falling.

2. The volcano of Kiraueah, differing from the forms usually attributed to volcanoes, viz., cone-shaped mountains with terminal orifices, is a vast sunken pit, of a nearly oval but somewhat irregular shape, with almost perpendicular sides; and from time immemorial has been prodigiously active, though it has not, within the memory of man, been known to overflow, excepting in the year 1787, three years previous to Vancouver's first visit to these islands, when a very dreadful eruption took place, and lasted seven days and nights. I have this information from the last of the Priests of Peli (the Goddess of the Volcano), who witnessed the scene, and saw, as he says, 5405 of his countrymen, the war party of Keoua, the cousin and great rival of Tamehameha, all perish

in consequence of their imprudently endeavouring to pass on the south-west side, while the red-hot material was carried in that direction by a strong trade-wind. This person afterwards assisted, also, in removing the remains of the dead to the fire into which they were thrown.

The height of Kiraueah above the level of the sea has been greatly over-rated at 10,000 feet: it is only 3873 feet. The depth of its sides, down to the first black ledge or plain within it, barometrically ascertained, is 715 feet; and to the lower black ledge 1058 feet by one observation, and 1096 by another;—in all these cases employing a reading before starting and another on returning, in lieu of a simultaneous observation, (and neglecting any correction for diurnal fluctuation of the mercurial column, for determining which, or the precise time of its occurrence, I have not a sufficient amount of materials.) The mean of these barometrical measurements differs but slightly from others which I made geometrically, and which gave 998·10 feet. From the lower ledge to the surface of the volcanic lakes, the depth, as near as I could judge, was 43 feet; which, added to the mean of the previous measurements, makes this awful place 1120 feet deep on the west, the highest side, and 1062 where my tent stood, at the north-west end. The latitude of this tent, by one meridian altitude of the sun, two passages of Sirius, and one of Canopus, is 19° 25′ 42″ N.

At the bottom two lakes of liquid lava first arrest the attention. When the wind blows strong, one may approach to within a few feet of the edge of the smaller one, which is a nearly circular basin, of 319 yards diameter, situated at the north, or wide end of the crater; but the heat was so intense it was impossible to reach the brink of the larger, which is situated near the south-west extremity, and, as near as could be determined, 1190 yards long, of a heart shape, and a breadth between the lobes of about 700 yards. The black ledge, however, from which these are viewed, is otherwise a sight which fills the mind of the beholder with awe. A space of five miles square, recently in a state of igneous fusion, in the process of cooling has been broken up into immense ledges and rolled masses, like the breaking up of a great river of ice; and these are of every shape and form, from gigantic rolls, like enormous cables, to the finest threads, like human hair, which are carried by the wind for the distance of miles round this terrific laboratory. Numerous chimneys, also, of various forms and sizes, are dispersed over the second, or lower, ledge; some of which emit slag, scoriæ, smoke, or steam, while others are comparatively tranquil. There were three cones or bluffs, which I observed in particular, of from 20 to 25 feet height, and about 120 yards breadth at the base, with lateral doors, like those of a baker's

oven, which, indeed, they otherwise closely resembled: and into these, by kneeling on the ledge, it is possible to peep, and witness a terrific vacuity, a red-hot atmosphere, while the volcanic agency is at the same time discharging by a terminal vent-hole. Both lakes of lava have a steady southerly current, the force of which I was enabled to determine accurately by throwing blocks of lava on the lake, and noting the time they took to pass 100 yards: it is at the rate of three miles and nearly a quarter per hour. The south end of both lakes presents thus one of the most magnificent spectacles in nature—a vast caldron of lava in furious ebullition, sometimes spouting up to the height of 20 to 70 feet, rolling and tumbling in fiery waves, hurrying along, and finally precipitated down an elliptical fiery arch (that of the north, or smaller, lake having a span of 142 yards, with a maximum height of about 43 feet). In this awful arch the force of the lava is in a degree arrested by the escaping of the gases, or volcanic forces, and large blocks are thrown back, and literally spun into the filamentous glass already noticed, which is carried by the wind, like the refuse of a flax-mill, all round the volcano. The sound issuing at the same time from the archway can hardly be spoken of;—that of the whole steam-engines in the world would be a whisper to it.

The southern, or great lake is otherwise truly sublime. It is not constantly boiling, for at times it appeared quiescent, with serpentine fiery streaks on the surface, while at others the lava was thrown to a fearful height. Shortly after the numerous vent-holes discharged their steam or slag, the lake for a short time became tranquil; and this continued to be the case during seven days and nights, the period of my stay.

To the east of this crater, at the distance of 370 yards, there is a very perfect circular one of much smaller dimensions, which has enjoyed, within itself, a long repose, for on the same level with its black ledge are found living trees with 120 concentric rings, or annual layers of timber. In June, 1832, on the neck between the two volcanoes, and on the exact spot where Lord Byron pitched a temporary house when he visited Kiraueah (called by him the Volcano of Peli) in 1825, the ground opened and discharged liquid lava, for the period of three days, into both volcanoes, which considerably filled them up. This was preceded by slight earthquakes; and all verdure touched by the lava, as may be supposed, perished,—excepting the ferns, which, after a lapse of nineteen months, rose strong through the fissures, from one to ten feet deep, and have sent forth luxuriant fronds, as though nothing had happened to them, much less that they had been deluged with fire.

A night view at Kiraueah is indescribably grand; and never can I forget that in particular which I witnessed on the 23rd January.

The sun set in all the glory of a tropical sky behind the majestic dome of Mowna Roa, clothed in snow for 2000 feet from the summit; and as he crept behind the mountain the brilliancy and splendour of the volcano became more manifest. But when the nearly full moon rose in silvery brightness from the bosom of the ocean, and, as if this was insufficient, the splendour of Sirius and Canopus were added, the whole gave the heavenly vault an indescribable magnificence, especially when contrasted with the perpetual, lurid, electric-like cloud which overhung the volcano. I sat for hours and enjoyed the scene.

On the 24th of January the temperature, at noon, on the northern brink of Kiraueah was 66°, dew point 42°; while on the black ledge at the same time the first stood at 89°, the latter at 41°, the wind fresh from the N.E. The same thermometer laid on the lava in the sun's rays showed 115°; shaded, 112°; and on the brink of the small lake 124°. The dew-point here could not be found in three trials, the scale of the internal thermometer being under that range; besides, the ether was boiling. At 5^{h} on the same day I returned to the outer edge of the black ledge, where a delicious cooling breeze was blowing from the N.E., and the thermometer stood at 78° 5′. Here the ether was readily expelled from the coloured bulb of the hygrometer, and the bottle of it usually employed for pouring on the ball was further cooled in a calabash of salt and water; yet when the instrument was carried to the brink of the caldron there was still no ring of condensation—air 113°. The dryness, in a word, was intense beyond description, and the heat overpowering. My very eye-lids felt scorched and dried up, to say nothing of the dreadful headaches which such exertion created.

The outlet of Kiraueah is at the sea, in lat. 19° 11′ 51″ N., nearly in the same meridian as the volcano itself. The place is called in the native language Punahala, or "broken in:" in the course of fourteen miles of latitude many overflowings have taken place; and in some of the deep chasms seventeen layers may be counted, between each of which there is a fringed matting of fern-bushes. The whole eastern point of Owhyhee from Kalanihala, or Heavenly village, through the district of Puna, is one entire sheet of lava from the volcano.

I next ascended Mowna Roa, and on the 29th of January succeeded in reaching the summit. My last sleeping station on the mountain was at the elevation of 10,724 feet, and the evening of the 28th gave me no view. I was above the region of fleecy clouds, which appeared like a country covered with snow, and the immense cloud which hung over the volcano rose like a tower in the centre. Sunset, however, gave a different aspect. The fleecy clouds changed their hue to a vapoury tint, and the cloud over

the volcano, from an intense silvery brightness which it always has in sunshine, deepened its colour, and gave out a splendid illumination. The thermometer fell to 17°; and this to the feelings was intensely cold. The next morning the sun rose in great beauty, and I caught his upper limb the instant that it appeared on the horizon; yet ere his whole disc was visible, the lower limb was flattened and ragged. The place where I stood was the limit of vegetation: all above was an immense dome of lava entirely destitute of verdure. Its ascent was gradual; but no words can express to you the ruggedness of its surface. The blocks of which it is composed are in some places smooth and glassy; in others compact and heavy, like basalt; in others light and vascular: they are of all colours also, and now thrown up in great mounds or ridges, or carried away in deep sunken valleys, as though scattered by some mighty river. Not twenty yards of the whole ascent can be called uniform, and in every direction vent-holes, or mouths, are visible, varying in size, form, and height. The lava which here issued from them presents also a novel sight, from some streams having been pressed forward transversely thus))))))); while from others they are fluted longitudinally thus ~~~~~~ ; and sometimes from the same mouths both kinds seem to have issued. Some also form circular masses, others are infinitely varied, and quite beyond my powers of description.

Walking on the snow early in the morning was excellent, but after the sun was two hours up it became very laborious. The centre of the dome is very flat: I mean that it has a very slight convexity; for though the day was unusually clear, I did not see the sea from the centre. It furnishes a horizon of itself, an immense elevated table-land, rather than the top of a mountain. The highest part is on the north rim, on the east side of the great terminal crater. The barometer here stood, at 3^h 10^m apparent time, at 18·736; air and mercury alike 36°·5; dew-point 3°·5: the wind strong south-west. The observations were repeated four times with always the same result. The simultaneous observations taken at Byron's Bay by Mr. Goodrich will be seen in the table annexed; and I value them the more as our readings constantly agreed within a very few hundredths of an inch. The weather at the sea was clear, with a fresh N.E. trade breeze.

The latitude of the great crater is 19° 27′ 4″ N., ascertained by a satisfactory meridian altitude of the sun. Much rain had fallen within the previous fourteen days to my visit, yet the snow was three to five feet deep on the summit. Mowna Kaah was also covered with snow at this time 1500 feet down; the dome

of Mowna Roa being a larger mass, the snow on it always descends lower than on the sister mountain.

Magnificent, as is certainly the great volcano of Kiraueah, on the flanks of Mowna Roa, yet the grand terminal crater at its summit is not unworthy of competing with it. It is one of, if not the very largest, though not the most active, in the world. The circumference of the present crater, as nearly as my circumstances would allow me to determine it, is about six miles and a quarter; and the line of the ancient and now extinct orifice is not less than twenty-four miles round. From the summit to the black ledge in the present crater is 1270 feet, and it appears to have filled up considerably; the black ledge is vitrified lava, like that of Kiraueah. The northern part appears to have very recently undergone violent action, not by lava boiling up, but by throwing out immense stones and scoriæ in prodigious heaps, presenting a scene of singular devastation. In the bottom of this part of the volcano immensely deep chasms are also seen, as though the mountain were cleft asunder by them: no bottom could be seen in them, nor could any sound be heard when blocks of lava were thrown down—probably owing, in some degree, to an incessant whizzing noise which issues from them.

The southern part of the crater has obviously been the outlet to the lava, many successive layers of this, varying in form, colour, specific gravity, &c., being here visible; but it seems to have enjoyed a long state of repose. It is probable that the volcano might be entered on this side. I made the attempt, but the numerous chasms concealed by the snow, and my want of a companion, on whose experience and readiness I could rely, obliged me to desist. I may probably succeed another time; meanwhile I have even now a most magnificent collection of lava specimens, showing the successive formations from the sea to the summit, besides a princely collection of plants, to show the verdure at different heights.

I remained one night at the top of the mountain, and suffered much from cold, though the thermometer only fell to 17°; also from hunger and thirst—all my guides, except one, having either refused to accompany me thus far, or deserted me in the course of the afternoon. The dip of the magnetic needle at Byron's Bay, lat. 19° 43′ 42″ N., is 45° 2′ 0″; at the elevation of 11,000 feet, in lat. 19° 49′ N., it is 45° 0′ 5″; and on the summit of Mowna Kaah, at 13,851 feet, in lat. 19° 50′ 1″ N., it is 45° 0′ 0″. The intensity and variation I have also found, by many observations, consistently the same at all elevations. One thing, however, ought to be remarked, which I observed especially at Kiraueah; viz., that the dipping needle and suspension bars for intensity

were, from time to time, most powerfully affected—not by coming to rest sooner, or by expressing a degree different from what might have been expected had no disturbing cause existed, but by irregular, jerking, twitching motions; the dip, for example, being sometimes 17°, 20°, 80°, and once 10°. The disturbing cause was therefore not permanent, but very variable; and did not arise from the accidental presence of any mineral substance, but from a *sympathy between the magnetical action and that going on in the crater of the volcano.*

In like manner, previous to and during earthquakes, I have observed a manifest disturbance in the action of the suspended bar. For example, on the 19th of February, at Byron's Bay, as is my usual practice when time permits, I was making a series of observations for the purpose of ascertaining if any diurnal fluctuation exists in the magnetical action, as in that of the barometer, when suddenly I found my observations quite irregular. The barometer stood at 30·042; thermometer, in the air, 78° 5′; and hygrometer, 76·0. A dead calm prevailed; the sky was slightly overcast by thinly-diffused clouds of a vapoury smoke tinge; near the horizon the vault, towards 2 P.M., became extremely red, fully equal to the splendour of a setting sun in autumn in England; everything, in a word, looked threatening. At $4^h\ 45^m\ 2^s$, apparent time, we accordingly experienced a dreadful earthquake, which lasted thirteen seconds; and as you may inquire how I took the time exactly, I may mention, that for the space of 2′ 42″ before the shock, its precursors were distinctly felt—first, a subterraneous howling noise, which gradually increased, and then an awful detonation, which was instantly succeeded by the shock, in strong undulations, not a heaving up, from south to north. The number of undulations was great, for the thirteen seconds appeared incredibly long; and a rustling of the leaves of the trees, though calm, and in the thatch of the adjoining houses, accompanied the noise. The sea receded about a mile, for a few minutes; and a part of the volcano fell in. The ground continued to be thus slightly, but sensibly, agitated during the whole night; and Mr. Goodrich's house, of wood, rolled like a ship in a storm, but did not fall. The shock was extremely local, and was not felt at all at forty miles distant on the opposite side; while others, much milder, have been universally felt. The magnetic bar continued greatly agitated through the whole period; but on the ensuing day, the 20th, I obtained consistent observations as usual, alike of dip, variation, and intensity.

This brings to my mind, also, a circumstance connected with the action of aurora borealis on the magnetic bar. On the 11th of May, 1833, in lat. 52° 33′ 46″ N., long. 122° 31′ 35″ W., this phenomenon occurred with singular beauty and strength for the

latitude and season of the year; and the bar continued affected the whole night, exactly as I have seen it since in the volcano of Kiraueah.

It is my intention to sail for England by the first opportunity; but as this is not likely to occur till August or September, I shall continue to labour at these islands to the best of my ability.

Barometrical Measurement of Mowna Kaah, Owhyhee—January 12th, 1834.

Lower Station—Barom. 29·910;	Merc. 71·0°;	Dew-Point 69·0°;	Air 71·0°
Upper Station—	„ 18·354;	„ 32·7;	„ 0·5;	„ 32·7

	Lower Station	Upper Station
Barometer	29·910	18·354
Index error	+ 0·052	0·000
Capillary action	+ 0·063	+ 0·063
Capacity of cistern	+ 0·013	— 0·165
Reduction of mercury to temp. 32°	— 0·098	0·000
True height of the columns of mercury at 32° Fahr.	29·940	18·252

	Engl. feet.
The difference in height of the two stations, computed by Problem XVI. of Mr. Francis Baily's Astronomical Tables and Formulæ, and employing the Table p. 183 of that work, is	13,558
And computed by the rule given in page 183 of Mr. Daniell's Meteorological Essays, second edition, in which a correction is introduced for the hygrometric state of the atmosphere, the difference is	13,500
Whence,	
Height of the lower station above the sea	83
Barometer below the summit of the mountain at the upper station	4
Difference in the height of the stations, by Mr. Baily's method	13,558
Height of Mowna Kaah, by Mr. Baily's method	13,645
Ditto by Mr. Daniell's method	13,587

Barometrical Measurement of Mowna Roa, Owhyhee—January 29th, 1834.

Lower Station—Barom. 29·920;	Merc. 79·0°;	Dew-Point 76·0;	Air 79·0°
Upper Station—	„ 18·736	„ 36·5	„ 03·5	„ 36·5

	Lower Station	Upper Station
Barometer	29·920	18·736
Index error	+ 0·052	0·000
Capillary action	+ 0·063	+ 0·063
Capacity of cistern	+ 0·014	— 0·159
Reduction of mercury to temp. 32°	— 0·111	— 0·001
True height of the columns of mercury at 32° Fahr.	29·938	18·639

	Engl. feet.
The difference in height of the two stations, computed by Problem XVI. of Mr. Francis Baily's Astronomical Tables and Formulæ, and employing the Table page 183 of that work, is	13,147
And, by Mr. Daniell's method, in which is introduced a correction for the hygrometric state of the atmosphere, the difference is	13,092
Whence,	
Height above the sea of the lower station	83
Difference of stations, by Mr. Baily's method	13,147
Height of Mowna Roa, by Mr. Baily's method	13,230
Ditto by Mr. Daniell's method	13,175

Barometrical Measurement of the Height of the Volcano of Kiraueah, in Owhyhee—January, 1834.

	Barom.	Merc.	Dew-Point	Air
Lower Station	29·910	75·0°	69·0°	75·0°
Upper Station	26·206	66·0	42·0	66·0

	Lower Station	Upper Station
Barometer	29·940	26·206
Index error	+ 0·052	0·000
Capillary action	+ 0·063	+ 0·063
Capacity of cistern	+ 0·013	— 0·045
Reduction of mercury to temp. 32°	— 0·111	— 0·075
True height of the columns of mercury at 32° Fahr.	29·957	26·149

By Mr. Baily's method, the height is . . 3873·7 English feet.
By Mr. Daniell's method . . . . . 3845·9 „

Barometrical Measurement of the Depth of the Crater of Kiraueah, in Owhyhee, February 4th, 1834.

As no simultaneous observations were made, the barometer was read off, before starting, and on the return, at the top of the crater, as follows:—

	At 8h 26m A.M.		At 4h 07m P.M.	
Barometer	26·338	Merc. 62°	26·292	Merc. 69°
Capillary action	+ 0·063		+ 0·063	
Capacity	— 0·044		— 0·042	
	2·6357	Merc. 62°	26·313	Merc. 69°

Mean, 26·335; Merc. 65° 5′; Air, the same.

At the lower station, in the crater, on the second ledge:—

	At 10h 52m A.M.		At 0h 00m P.M.	
Barometer	27·368	Merc. 77° 5′	27·358	Merc. 79°
Capillary action	+ 0·063		+ 0·063	
Capacity	— 0·027		— 0·027	
	27·404	Merc. 77° 5′	27·394	Merc. 79°

Mean, 27·399, Merc. 78° 25′; Air, the same.

Computed by Mr. Baily's method, the difference in height of the two stations is . . . . 1096 English feet.

The barometer carried to the summits in the above observations was one made by Newman, under Captain Sabine's superintendence. Its capacity is $\frac{1}{65}$; capillary action, +063; and neutral point, 29^{in} 122. It was filled *in vacuo*, and boiled. The one on the sea-shore was filled (not *in vacuo*), and boiled by myself, and is of the same dimensions with the other. Its neutral point is also the same; but it has an index error of +052. Both appeared quite perfect, and the whole column of the one on the mountains was exposed, excepting about three inches near the neck. Not a speck of residual air could be seen in it even with the help of a lens; it appeared like a polished steel-bar.

I cannot omit the present occasion of speaking with the highest commendation of the repeating reflecting circle with which I measured most of my angles. Sea-faring men seem generally to dislike this instrument, and complain of its weight; but, for my part, this is rather a recommendation of it to me—it enables me to observe with far more steadiness. A little practice is perhaps necessary to use it with facility; but it is such a gratification to be able to bring all the operations within the power of one observer, that I think no one, who has overcome the first difficulties, will object to any remaining inconvenience.

III.—*Account of the Island and Province of Chiloè.* Extracted from the Remark Book kept on board H. M. S. Pylades, by Captain Blanckley, R.N. MS. 1834.

The island and province of Chiloè is the southernmost of those which compose the state of *Chili,* and extends from latitude 40° 48′ S., where, on the continent, it joins with the province of Valdivia, to latitude 43° 50′ S., where the dependencies of the island known by the name of the *Archipelago* of Chiloè terminate, and which comprise a number of islands extending from latitude 41° 48′ S. to latitude 43° 50′ S. These islands are to the eastward of Chiloè, and between it and the coast of Patagonia. Out of sixty-three islands so situated, thirty-six are inhabited, which are enumerated in the annexed table of the different divisions which compose the province. The length of the island of Chiloè from north to south is about 120 miles; its greatest width, which is about the centre, is about 60 miles. The whole island is mountainous and covered with wood, chiefly a bastard cedar, but so durable, that it is exported in great quantities to Peru and Chili, where it is used in building, being, from its hardness, not liable to rot, and well adapted for beams and rafters. It is also used in building vessels in the island. In the interior, to the south-west and southward of the lagoon or inlet of Cucao, is situated a large

freshwater lake, named the Lake of Campu; and from the number of fresh-water rivulets that run into the sea from all parts of the coast, I make no doubt, that, were the island better known, many such lakes would be found; but as yet the interior has never been penetrated beyond one league from the coast, excepting only to the lake of Campu. The country is so wooded and overgrown with underwood, that it would cost too much labour for the indolent and limited population to undertake such an expedition, unless a prospect of great gain were offered to them, as the line of coast and islands are even more than sufficient for the maintenance of the few inhabitants. The government (which is very poor) has no inducement to explore its interior; and even the southern coast of the island is scarcely known. This is the reason why the southern islands of the Archipelago, as well as the island of Chiloè itself, from about 43° S. latitude, are denominated the end of Christendom; and the natives are fully persuaded that part of the island is inhabited by cannibals. I offered a considerable reward while there, in hopes of persuading persons to explore this district for general information; and the governor and his secretary (the latter a native of Sweden, and a scientific gentleman) used their influence to get my offer accepted, but without success.

The Lagoon of Cucao, on the western coast of the island, is in latitude 42° 55′ S., and is upwards of seven leagues in length. It is surrounded by lofty mountains, and, during the day, from the time of sunrise until sunset, is totally inaccessible to vessels, on account of the violent gusts of wind which come down from between the hills from different quarters at the same time, and raise such a whirlwind as to tear up trees, and would certainly dismast or upset any vessel. This continues till the sun has set, when it subsides to a perfect calm till the following morning.

Population and Divisions.—The population of Chiloè, and the islands attached to it, is 43,832 souls. The table which I annex shows the number of inhabitants in each town and village. The island is divided into ten divisions, as follows:—St. Carlos (the capital), Carelmapo, Chacao, Calbuco, Dalcahue, Quenac, Quinchao, Castro, Lemuy, Chonchi, each of which has its respective court of justice and local governor. There are no subdivisions, except into parishes, which amount to ninety. For electing deputies for the Congress, the province and island are divided into three departmental divisions: the first comprising St. Carlos, Carelmapo, Chacao, and Calbuco; the second Quinchao, Quenac, and Dalcahue; the third Castro, Lemuy, and Chonchi. Thus three members represent the interests and opinions of the province in Congress. The Table, letter A, gives the correct state of the population, and of their respective ages and sexes, as formed in the year 1832; and it will be observed that the sexes,

as nearly as possible, equal each other in number. The small islands are relatively more densely peopled than Chiloè, although the soil is not so productive on them as on the main island; but the reason they are preferred is their not being encumbered by woods, the people being in general too indolent to clear the best land, so long as they can find a sufficiency of what is moderately good for their daily subsistence without much trouble. They are satisfied with little, and only care for the present. Money is only known to them by name; it is not in circulation. Since the supreme decree of January, 1826, which extinguished all animosity and feelings of superiority, such as formerly existed between the old Spaniards and present natives, by placing them on equality in all civil and public acts, the utmost cordiality has reigned among them.

Military Force.—The military force consists of militia (with the exception of one company of artillery, which is paid by, and belongs to, the State), and amounts, including infantry and cavalry, to 7459. All inhabitants between the ages of sixteen and fifty are enrolled in this militia, and obliged to serve in rotation, or when called on by the authorities. They are all supplied with arms and ammunition, and are occasionally mustered. Table B will show the number of troops provided by the different towns, &c., out of the number of militia stated;—244 are cavalry, and are not furnished by the island, but from Maulin, which is the only town belonging to the province on the continent. The remainder of the force is furnished by Chiloè and the islands.

Roads.—The principal road in Chiloè is from St. Carlos to Castro, which is the second capital, and situated to the S.E. This road winds along the sea-coast with a branch leading to Dalcahue, and is eighteen leagues long; it is called the road of Caynennuco. It is formed principally of broad planks and trunks of trees, the latter being used where there is an ascent. It was constructed and is kept in repair by the militia of the eight districts which partake, more or less, of the advantage of such a means of communication;—that is to say, a portion of the militia is employed in rotation from twelve to twenty days in each year, each battalion and company having a part of the work assigned them, for which no remuneration is allowed, by which means this beautiful road is kept in good repair with little effort, though the expense would otherwise amount to a considerable sum, 1000 men being thus employed annually. In the last repairs they commenced placing parapets on the sides of this wooden road, and they are now building small houses at each station of the different battalions which furnish their quota of labourers. Good water is to be had along the whole line of road, but nothing in the way of food, except what they carry in their havresacs. In a military

point of view, this road affords excellent places for ambuscades and defensive passes against a superior enemy.

The road from Carelmapo (on the main) to the province of Valdivia is much of the same kind as the one just mentioned, and is for twelve or fifteen leagues composed also of plank, &c. It is less guarded, however, by parapets, and is very inconvenient, especially during winter, being both excessively muddy and full of holes, the same attention not being paid to it as to the one on the island.

The road of Rodeo, along the sea shore from St. Carlos to Castro, deserves only the name of a path. It follows the direction of the Caynennuco road, but is more than twice its length; and being nearer the sea-side, it is only passable for travellers, in many parts, at low water. Only a small portion of it, also, is planked. Carts or carriages are not used in the island, or even the province. There is but one cart at St. Carlos drawn by oxen, and the roads would not admit, at present, of such vehicles.

Harbours.—Four harbours are acknowledged, by the captain of the port, in the island of Chiloè, viz.—St. Carlos, Chacao, Dalcahue, and Castro; in all of which vessels of any size may anchor with the greatest safety. In St. Carlos and Castro ships ride quite land-locked close to the shore in good holding-ground: the former is on the N.E. side of the island; the latter, as well as Dalcahue, on the S.W.; while Chacao lies to the N.W., a little to the eastward of the canal of that name, and is formed by the island and continent opposite to it. The navigation of these harbours is not dangerous, and but little knowledge is required to enter any of them. The distances by sea between the ports are as follows:—

From	St. Carlos to Chacao	22	Miles
	St. Carlos to Dalcahue	87	,,
	St. Carlos to Castro	119	,,
	Chacao to Dalcahue	75	,,
	Chacao to Castro	97	,,
	Dalcahue to Castro	32	,,

The port of St. Carlos is that which deserves most the attention of navigators and of maritime nations. The island of Chiloè has always been considered the key of the South American possessions, and this secure, beautiful, and capacious harbour ought to be its primary attraction. It is well known that all the harbours on the coasts of the Pacific are open to the N.W. winds, which, during the winter, rage with such fury, on the coasts of Chili and Peru, that it is dangerous for vessels to ride in those roadsteads during that season. The beach of Valparaiso in particular annually exhibits the sad consequences of holding on against a N.W. wind; and

when I was there the beach presented wrecks of large vessels thrown high and dry many fathoms above the then water-mark. H. M. S. Dublin had rode out one of these gales, but anticipating another, lost no time in weighing and running for Coquimbo, which latter port I should have excepted, as it is certainly a safe and secure harbour, though it has some disadvantages from which St. Carlos is exempt: the principal one being, that at Coquimbo there is but one narrow entrance, and should the wind blow direct in, no ship can sail. Vessels are thus often detained a week at a time—not to speak of the want of water. I have also at Coquimbo witnessed, when anchored not a quarter of a mile from the shore, such an unpleasant, short-breaking sea, that it would have been impossible to have got off stores or provisions without injury; while at St. Carlos, during two heavy gales of wind, the sea at our anchorage was scarcely ruffled, and we were never prevented communicating with the shore. It was during a gale from the N.W., indeed, which blew down many houses, that we completed our water at St. Carlos; and a ship or fleet of any size may equally ride there in the greatest security. The best anchorage is between Fort Barcacura and Sandy Point. This fort bears about E.N.E., true, from Fort Aguy; and between the two are some rocks just above water, called the Puercas, but with five fathoms close to them. Our anchorage was about a cable's length from the shore, at which distance, to and about the watering place (Sandy Point), there are from seven to fourteen fathoms at about the same distance from the shore that we anchored. One of the principal advantages, however, of St. Carlos is, that it has two entrances or outlets. Should a fleet or ship be anxious to put to sea during a strong N.W. or W.S.W. wind, both being such as will not admit of any vessels sailing by the western entrance (partly from the high sea that stretches across the bay, and partly from the strength with which the current sets to N.E., and towards Estero de Maulin, which I attribute to the bottom being uneven ground), in such case there is an easy and safe passage round the northern part of the island by the canal of Chacao, and so through the Archipelago to the eastward. The captain of the port, an Englishman, who has resided there seven years, assured me that it was the safer passage of the two, there being no dangers that are not above water, and even of these very few. He has thus taken many vessels out by this passage, although bound to the northward, during heavy N.W. gales, when it would have been madness to have attempted the other passage. Captain Williams is a captain in the navy of Chili, and, having been bred a sailor, understands his business well. Experience has also made him familiar with every rock, bay, and creek in the neighbourhood.

I would recommend ships bound to St. Carlos from the west-

ward to enter the Bay, if possible, early in the morning, and keep the island of Chiloè close aboard, after making it well to the southward of Point Guaban. The tides run so strong, that if you get out of soundings you may be drifted on the rocks or islands of Carelmapo, where there is no anchorage, or even landing for a boat; for such is the force of the tides, that in the calmest weather the sea breaks frightfully against them. Should the wind fall light, therefore (which it generally does towards the afternoon), and you find yourself drifting off the land to the eastward, no time should be lost in anchoring, as from thirteen fathoms you suddenly find no bottom. In rounding Cape Aguy, vessels should keep within a quarter of a mile of it in from nine to ten fathoms, and anchor under the fort of Barcacura, where, as before observed, they will be well sheltered from all winds, and close to the watering place. The ground on the town side is shoal and rocky. The small Admiralty plan is, however, generally correct, except that it does not sufficiently point out a reef lying between Cochinos and the highland above the town of St. Carlos, called Guihnien, near which it is dangerous for a boat to attempt to land, from a number of small pointed rocks just under water, which I named the Needles. Our bearings at anchor in 7½ fathoms were—centre of Cochinos N.E. ½ E., Point and Fort Aguy N. ¾ E., Fort Barcacura N.W. b. N., Sandy Point W. ½ S. Beef, poultry, wood, and vegetables, are to be had for a trifle, and in abundance; fuel only costs the trouble of cutting, the doing which confers a favour on the proprietor of the soil; and it is close to the beach. It will perhaps be proper, however, to mention here, that money is not current in the island, but that necessaries are obtained by barter; the principal articles of which are indigo, tea, salt, and a mild sort of Cayenne pepper. Indigo is the chief object, as it is used for dyeing their cloths for making the South American cloaks, called ponchos, which are merely *squares* of cloth with a slit in the middle to admit the head, and thus allow the cloak to rest on the shoulders. They are made to perfection, and sent to all parts of the continent, from the island of Lemuy; they are generally manufactured from wool, and almost every cottage has its loom. The sheep are bred and kept solely for the sake of their coats, and nothing could induce the inhabitants to part with these animals or their lambs. It is needless to add that they never eat them.

The harbours and coast in general abound with all sorts of fish, and among others the finest oysters and other shell-fish. These constitute, indeed, the chief food of the lower orders, and are taken in a manner which I shall here mention, as it is a proof of their great abundance. At low-water mark the natives dig out a narrow trench in the sand with a circular basin at its extremity

on the land side. This they stake nearly all round with twigs laid close together, and as soon as the sea reaches its height and is about to recede, stakes are driven in the sand at the only part left open of the circle, which when left dry is found full of fine fish. I witnessed this operation about a mile from the town on the beach, and it produced as much fish as three men could carry away in baskets, the whole the produce of one tide. Tobacco is in great request, but as it is a monopoly of government, its price is too high for all classes to purchase, consequently on our arrival a few leaves of this plant were invaluable. Money when offered was rejected, from its value not being known; but for a pound of tobacco I actually purchased twelve fowls, three bags of potatoes, four dozen eggs, and half a boat load of oysters. Candles also were in great request. I had by me a private letter of credit; and as there were several respectable shopkeepers at St. Carlos, among whom was an Englishman, I was anxious to get a bill cashed upon Valparaiso for about 400 dollars, to enable me to purchase a few refreshments for the ship's company, which their good conduct during the severe cold and tempestuous weather we had previously experienced merited; but although the governor gave orders that all the dollars in the town should be collected for me, at a great loss and under his responsibility, we could not muster above 220. I therefore allowed each man to take up a pound of tobacco; and in a few hours every one was eating his poultry, vegetables, and the finest fruit; and as scurvy was, I feared, beginning to show itself, I had reason to rejoice at seeing our men enjoying themselves with all the dainties they could desire.

The port of St. Carlos is surrounded by fortifications, more or less deteriorated; but some are serviceable, and all at a trifling expense might be made efficient. The principal one is Fort Aguy. The defence of the port, and it may be said of the archipelago in general, ought, however, to be confided chiefly to gun-boats and small vessels, well equipped. These, with a little foresight and the assistance of a few European articles, might easily be constructed at a small expense in the island. The number of small coasting-vessels or boats which carry on the traffic among the islands and its coast amounts to 1490.

Climate.—As to the temperature and climate of the province of Chiloè, nothing certain can be said, from our limited stay in it; but from the statement of those who have been residents for many years, it may be thought rigorous—not from excess of cold (for water scarcely ever freezes, and what might be called a fall of snow is not known,)—but from damp and rains, as on an average ten months out of the year may be called rainy. Yet, though rigorous, the climate is far from unhealthy; and there are no

peculiar diseases. The people in appearance are like Northern Europeans—fine, manly, athletic, robust, and fresh-coloured. On landing, a stranger is struck indeed with the fair and rosy-looking complexions of the inhabitants, particularly of the women and children, with whom light flaxen hair is the prevailing colour. Were it not for the narrow, dirty streets, or rather lanes, and small wooden houses, one might even imagine one's self in an English village. What speaks much both as to the healthiness of the climate and the integrity of its inhabitants, is the circumstance that among the whole community there is neither a medical man nor a lawyer. An American gentleman of the profession of Æsculapius came to St. Carlos as a practitioner; but finding that he was not likely to obtain employment, he gave it up, and turned farmer; and when we were there he was living some twenty leagues off, cultivating the land which had been granted him gratis by the governor. A lawyer they only know by name. A supreme judge has been appointed since 1831; but there is no court-house, and he told me that since his arrival he had not once had occasion to use his calling. There is a prison, and the secretary to the government assured me that, during the seven years he had been in the island, not one person had ever been confined in it. While we were there, however, it was tenanted by fifty galley-slaves sent from Valparaiso, as the government did not wish the building to be unoccupied; but the inhabitants were so shocked at these men being sent, that they requested the governor would not allow them to go about the town to sweep the streets, or be employed on public buildings, which they were intended to do; offering rather to supply the requisite number of workmen from among themselves without any charge; and they actually built a wall around the prison to enable the convicts to take exercise, beyond which wall they never appeared. There is not a slave in the island, and but one black man, who is considered quite a novelty whenever he makes his appearance in the towns.*

Productions.—These consist principally of wheat, barley, potatoes, all sorts of European vegetables, and fruits, the latter in great quantity, as apples and pears. According to the tithes (which are always taken in kind), the annual productions amount to

49,345 fanegas (Spanish) of wheat.
10,400 ditto of barley.
206,200 ditto of potatoes.

In some years as many as 8000 fanegas of wheat have been exported from the island; but this ought not to be considered a general part of its commerce. Wheat only yields from five to seven for one. But as an article of exportation in the way of food, potatoes ought to be, and might easily be exported to any extent, being very abundant, and of excellent quality. Oats and other grain are also

produced, but in small quantities, and only in a few spots. There are abundance of trees, but as the different qualities on the island have not been ascertained, I could get no account of them. Vast quantities of plank are, however, exported, both of bastard cedar and a species of fir, of which planks two feet wide are sent out to the amount annually of 232,777. Near the coast small trees are also found which make good spars for masting small vessels. For the productions of the soil, and animals, see Table D. The soil is rich, though never manured; it consists of dark mould and fine loam upon chalk: fruit-trees flourish astonishingly; and I never saw finer peas, beans, cabbages, or cauliflowers. The principal beverage is cider made from good apples, and when bottled and kept a short time, it is so strong, that a stranger must be careful how he indulges in it. It is like champagne, but stronger, and of a very fattening quality. I was informed that the healthy appearance of the natives was attributed both to the climate and the cider. Spirits are not known to the lower orders, and seldom can be purchased. Wine is never seen, and the government has placed so high a duty on it that it cannot be purchased, by which means the morals of the people are preserved. They are in general shrewd, clever, and most courteous to strangers. They still bear a strong good feeling towards the mother-country, and do not despair of again returning under her sway. It will be remembered that Chiloè was the last possession held by Spain in the Pacific, and in two severe actions defeated and drove the patriots off. One expedition, under Lord Cochrane, was repulsed with great loss; and the fort of Aguy, with only sixty artillerymen (old Spaniards), successfully defended itself against his Lordship in person with 1500 men. It was at length taken by Admiral Blanco and a host of gun-boats, frigates, and sloops; but they would not then have succeeded had not bribery and treachery come to their aid. This was seven years ago. Shortly after its capture, several attempts were made to retake it by a revolution; and they succeeded, and sent the military governor and all the regular troops off the island. But the mother-country not being able to afford them relief, they were induced to accept the terms offered them by the government of Chili, viz. to be governed by a civil governor from the island, and to protect themselves by their own militia, which is their present state. Most of the king's troops have remained in the island, and many officers flocked there at the disbanding of the king's forces in the other provinces.

Principal Exports.—These are planks, annually amounting to 260,908; hams, 7,800; dozens of brooms, 44; hides, 237. The value of the above, taken altogether, may be rated at 24,800 dollars: besides which, quantities of woollen cloths, such as ponchos, are annually exported; but as every house has its loom

and weaver, no specific estimate can be formed of their number or value. A woollen poncho is worth from three to ten dollars.

Chiloè is famed in South America for its hams, which are certainly of fine quality and high flavoured, and would be more so, were not so much economy necessary in that scarce and valuable article, salt. The island swarms with hogs, which are domesticated and live generally in the houses; and it is not unusual to see a pretty woman sitting on a stool with a favourite little pig in her lap; others will have a lamb or a fowl; all have some pet; and I remarked that the generality of the people are kind to animals. Poultry are in abundance; ducks were first introduced about two years since; and as they are not much approved of for eating, they have wonderfully multiplied.

Clergy.—There are but four rectories, which are those of San Carlos, Calbuco, Achaò, and Castro. The one of San Carlos comprehends the districts of San Carlos, Chacao, and Carelmapo, containing seventeen chapels; Calbuco comprehends the district of the same name, and has fifteen chapels; Achaò comprehends the districts of Quinchao, Quenac, and Dalcahue, with twenty-six chapels; and Castro comprehends the districts of Castro, Chonchi, and Lemuy, with thirty-two chapels. There are four parochial churches, one in each of the following towns, San Carlos, Calbuco, Achaò, and Castro; besides which there are minor churches, one in each of the principal towns of the remaining districts; and scattered over the island there are, besides those enumerated, eighty small temples or temporary chapels, badly built, none of them possessing any of the requisites for performing divine worship according to the Catholic religion; so that when mass is to be performed, the priests bring what is required with them. Besides the above there are two more churches; one of the order of San Jeronimo, at San Carlos; the other which belonged formerly to the Jesuits at Castro; and there were also two others belonging to the Mendicant order of St. Francisco and La Mercede, but these are now a heap of ruins.

At present, in the whole province, there are but nine beneficed priests, a vicar and rector of Achaò, two rectors of Calbuco and Castro, which are secular, a rector of San Carlos, of the regular clergy, and five others. It will be seen that, considering the number of inhabitants, there is a very unequal proportion of clergy, both as to the number of souls and places of worship.

Education.—In 1832, the number of schools in the island was 31, which educated 1271 youths, as will be seen by the Table C. There has been, however, a great falling off, both as to number of schools and pupils, for in the year 1829 there existed 90 schools, which educated 3847 boys. They belong to the state, and the masters are paid by the Government, at the rate of 300

dollars annually. By an order of Congress, no corporal punishment should be inflicted, which, however, some of the masters assured me was not attended to.

Government, Revenue, &c.—The civil, political, and administrative government of the province is exercised by an intendente or civil governor, who is supreme, and by the commander of the forces, either in person or by deputies; the latter governing in their respective districts. There is one feature in the government of Chiloè that does not exist in any other part of the South American states. To the southward of the island reside a number of Indians, who are governed by two caciques, holding their authority from the head governor of San Carlos, and they rule by their own laws, as I understood, with great justice: the Indians are thus seldom seen in the towns, and no complaint is ever made against them.

The expenses of the government depend chiefly on the number of the garrisons employed; and as at present not more than one company of artillery is paid by the state, they are necessarily trifling. Perhaps the whole cost of the government, including repairs of forts and public buildings, &c., does not at present amount to more than from 30,000 to 40,000 dollars a year.

The principal revenue consists of a tax to the extent of a tenth of all produce, which is farmed out annually, and yields from 8000 to 9000 dollars. As there is no money current, the farmer collects the revenue in kind. The export duties amounted in 1832 to 1374 dollars and 1 real (*5d.*): the import duties amounted to 2276 dollars; the latter was derived from 26 vessels, foreign and national. The revenue of the post-office and duties on various merchandise amounted, in the same year, to 4300 dollars, making a duty paid to government, on the exports and imports alone, amounting to 4950 dollars.

The land in this province, not including that which is not inhabited, and which may be considered at nine-tenths, is divided into numerous small possessions, so that each father of a family is the possessor of some portion of the soil; but there is not an individual in the island who has possession of land of the value of 1000 dollars, although perhaps it may be some miles in extent; and only two or three are valued above 500 dollars. This depreciation of land is in consequence of the few inhabitants in proportion to the soil. In the year 1829, the government commenced putting in force the laws of the constitution made in June, 1823, securing to the Indians perpetual and undisturbed possession of the lands actually possessed by them: to accomplish which surveyors are still employed marking out and measuring each individual's possessions, and marking out and defining the boundaries of those lands in portions which have no actual possessors, in order to their being sold for the benefit of the state. The

result of these operations in the five districts where land has already been portioned out, viz. Dalcahue, Quenac, Quinchao, Lemuy, and Castro, has been as follows :—

	No. of Spanish Squares.
Possessions confirmed to the Indians . . .	10,765
Remaining to the State	2,002
Total . .	12,767

The value of the squares of land belonging to the state is estimated at about 5,000 dollars.

Mines.—As yet no mines have been discovered in these islands ; but the numerous streams that run into the sea are strongly impregnated with mineral substances. Some have a copperish taste, while others, pure and limpid, appear to be impregnated with carbonate of iron. In several parts traces of coal are to be found, and I have no doubt that some future period will disclose many valuable resources at present unknown.

Natural History.—The island of Chiloè is well worthy the attention of a naturalist or botanist, who would be amply repaid for taking a trip to this delightful spot. It abounds in insects, butterflies, and birds, very choice and rare, many not being known in other parts of the continent of South America. I shall mention one curious bird, called in Chiloè canguena, which is only to be found here. I succeeded in procuring four specimens of it, with the hope of introducing them into England. They partake in appearance and formation of the duck, goose, guinea fowl, and, in plumage, of the partridge (red-legged) and pheasant. In size they are nearest the guinea fowl; and although web-footed, they do not take the water, but are constantly dipping their feet in small pools to prevent the web of the feet from cracking. Their legs are black, and the breast is marked like the red-legged partridge. The belly is of a light brown; the back like a hen pheasant; while the neck resembles the guinea fowl, the upper part being marked not unlike that bird. The head, with a black beak, is exactly that of a Bengal goose, but with a remarkably fine eye. When caught young, they are easily domesticated, and live with other poultry. Their flesh partakes much of the flavour of the pheasant, but not so dry. Those I procured were given me by the Governor, and were taken from his poultry-yard. I lost them one by one during a severe illness on my passage home, in consequence of not being able to attend personally, which I previously did, to see that they had water twice a day to paddle their feet in. This not having been attended to, their webs split, caused sores, and they died in a few hours. What I regretted also was, that, on my recovery, I discovered that, as they died, their skins had been committed to the deep. One I have brought home, but I fear it is not in so perfect

a state as to give a just idea of the animal; it is, however, in the hands of a skilful naturalist.

Although the coasts of Chiloè abound in shell-fish, I could not procure any shells of value, except a few beautiful chitons, as they have here been found. I made anxious search, in the hope of finding one with nine scales or divisions, but I did not succeed, although I employed several natives in the search, and offered a reward of twenty dollars to whoever would bring me one. I however got one of seven divisions, which is also rare. When the Beagle was here, an officer on board procured one of nine. Eight is the most common number.

General Society.—Before taking leave of Chiloè and its inhabitants, I must add a few remarks as to the general state of society and the good disposition of all classes. Murders, robbery, or persons being in debt, are never heard of; drunkenness is only known or seen when European vessels are in port: not a private dwelling in the towns or country has a lock on the doors; even the custom-house is only secured by a padlock, attached by two staples fastened on the outside, which might easily be drawn or broken:—good faith towards each other is thus a prevailing quality. They have no markets: when an individual has any thing, such as provisions, to dispose of (and all have their regular customers), he goes to his neighbours, and should no person be at home, he knows what is required for the inmates, and leaves it, paying himself, by barter, in indigo, pepper, salt, &c., which he knows where to look for; and as every article of consumption has its regular value, there is no fear of his acting unfairly, or taking more than his due. I have often witnessed people arrive from the country with poultry or eggs to dispose of, and offer them for sale at the house of the captain of the port. The first question asked is, What do you sell for, aunil (indigo) or money? should the vender answer, for money (which is rare), he is sent away; but if for indigo, the scales are produced, and as many ounces of that article are weighed out as correspond to the value of what is to be purchased. Indigo is valued at two reals (about ten-pence English) the ounce, and is purchased at Valparaiso, wholesale, at half that amount. There is also a curious practice among those from the country who bring milk, butter, &c. to the town of St. Carlos. At the extremity of the bay, and opposite the town, is a river that runs up about forty miles to the village of Cacotrce; from which they come to St. Carlos in large boats, and their passage is defrayed as follows. The owner of these boats may have a few goods to transport, but the boat is too large to manage by himself, he therefore places his goods in the bottom, cuts a stout twig which he erects as a mast, and prepares a smaller one for a yard, which he places across the gunwale.

Presently arrive several natives, with their butter, &c.; they step into the boat, and deliver at the same time their ponchos or cloaks to the owner, who, with a sort of rush, laces them altogether; and when he has collected about a dozen, they are bent on to the yard and used as a sail. They then bend their course across the bay to St. Carlos; where, on landing, each retakes his cloak till the evening, when they return by the same means. This is the payment for their passage to and fro.

The inhabitants are very cheerful, and appear the happiest race I ever beheld. Their amusements, high and low, consist in dancing to a guitar, always accompanied by the voice; and, with chicha and cider from apples, they will dance for ever. The females, almost without exception, sing well; their figures also are good, and, accustomed to dance from their infancy, they would not discredit the best European ball-room. All are passionately attached to music; and it was pleasing to hear some of Rossini's best operas sung to pianos, of which there were several in St. Carlos, and well performed, both vocally and instrumentally.

We experienced the greatest possible attention from all classes, and each seemed to vie with the other in marking the friendly feeling they bore towards us and our nation. The Governor's politeness and attention I can never cease to remember; as also the politeness of the chief secretary, Sr. Ferulas, who is a very intelligent person, speaking various languages. He was formerly secretary to the present King of Sweden, but was obliged to fly his country from political causes. He is, in fact, considered the governor of the island, as the actual governor is a native of St. Carlos, and was never absent from the island. We parted with all our good friends with much regret.

PROVINCE OF CHILOE.—TABLE A.

State of the Population, with the Distinction of the Departments, Ages, and Sexes, found in the Year 1832.

Departments.	Sexes.	Whether married or not.	Under 7 Years.	From 7 to 15 Yrs.	From 15 to 25 Yrs.	From 25 to 35 Yrs.	From 35 to 50 Yrs	From 50 to 70 Yrs	Above 70.	Total Unmarried Men.	Total Married Men.	Total Men.	Total Unmarried Women	Total Married Women.	Total Women.	General Total.
San Carlos.	Men	Unmarried	554	418	166	62	39	26	24	5,289	..	..	..	..	..	..
		Married	..	..	56	245	232	113	25	..	671	1,960	..	..	..	..
	Women	Unmarried	493	399	241	97	101	88	45	..	..	..	1,464	..	..	..
		Married	..	1	141	304	185	73	19	..	..	..	..	723	2,187	4,147
Carelmapu and Maulin.	Men	Unmarried	191	165	100	18	8	10	11	503	..	..	..	..	..	..
		Married	..	..	21	57	94	36	7	..	215	718	..	..	..	..
	Women	Unmarried	216	183	119	32	41	29	5	..	..	..	665	..	..	..
		Married	..	..	51	72	66	22	4	..	..	..	..	215	840	1,558
Chacao.	Men	Unmarried	273	195	65	14	7	16	3	576	..	..	..	..	..	..
		Married	..	6	64	106	78	90	17	..	361	937	..	..	..	..
	Women	Unmarried	267	206	69	25	15	39	9	..	..	..	630	..	..	..
		Married	..	15	117	108	68	53	5	..	..	..	..	366	996	1,993
Calbuco.	Men	Unmarried	917	535	231	71	19	21	10	1,804	..	..	..	..	..	..
		Married	..	3	189	322	258	127	17	..	978	2,782	..	..	..	..
	Women	Unmarried	869	489	274	69	82	43	19	..	..	..	1,815	..	..	..
		Married	..	20	289	308	260	82	18	..	..	..	..	977	2,822	5,604
Dalcahue.	Men	Unmarried	493	420	120	68	38	29	15	1,183	..	..	..	..	..	..
		Married	..	..	96	244	230	93	20	..	683	1,866	..	..	..	..
	Women	Unmarried	478	319	126	70	47	25	11	..	..	..	1,096	..	..	..
		Married	..	..	130	290	171	70	11	..	..	..	..	672	1,768	6,364
Quenac.	Men	Unmarried	376	272	117	43	16	21	6	851	..	..	..	..	..	..
		Married	..	2	56	127	142	107	29	..	463	1,314	..	..	..	..
	Women	Unmarried	386	273	129	58	44	29	13	..	..	..	932	..	..	..
		Married	..	1	94	151	129	70	14	..	..	..	..	459	1,391	2,705
Quinchao.	Men	Unmarried	910	723	306	65	30	34	13	2,082	..	..	..	..	..	..
		Married	..	1	160	285	365	317	45	..	1,173	3,255	..	..	..	..
	Women	Unmarried	795	755	326	104	96	84	18	..	..	..	2,178	..	..	..
		Married	..	7	269	372	375	127	23	..	..	..	..	1,173	3,351	6,606
Castro.	Men	Unmarried	1,147	897	433	81	50	80	1	2,689	..	..	..	..	..	..
		Married	..	1	176	416	439	439	10	..	1,481	4,170	..	..	..	..
	Women	Unmarried	1,129	801	442	104	121	124	1	..	..	..	2,722	..	..	..
		Married	..	..	390	450	425	213	3	..	..	..	..	1,481	4,203	8,373
Lemuy.	Men	Unmarried	534	515	258	65	21	22	10	1,425	..	..	..	..	..	..
		Married	..	..	75	294	302	212	38	..	921	2,346	..	..	..	..
	Women	Unmarried	597	459	253	79	78	73	17	..	..	..	1,556	..	..	..
		Married	..	..	1,136	302	309	149	21	..	..	..	..	917	2,473	4,819
Chonchi.	Men	Unmarried	671	430	206	90	62	26	14	1,499	..	..	..	..	..	..
		Married	..	6	96	207	219	132	40	..	700	2,199	..	..	..	..
	Women	Unmarried	618	413	221	145	78	38	19	..	..	..	1,532	..	..	..
		Married	..	7	185	205	208	97	20	..	..	..	..	792	2,254	4,453
Totals.	..	..	11,934	8,937	6,993	6,225	5,548	3,483	712	13,901	7,646	21,547	14,580	7,705	22,285	43,832

Table B.

Showing the Military Forces composed of Militia, and the different Districts that furnish them.

Districts and Battalions.	Batt.	Companies.	Captains.	Lieutenants.	Ensigns.	Sergeants. First Class.	Sergeants. Second Class.	Drummers and Fifers.	Corporals. First Class.	Corporals. Second Class.	Soldiers.	Total.	No.	Lieut. Colonels Commanding.	Adjutants.	Standard Bearers.	Remarks.
St. Carlos & Chacao	1	8	8	7	16	8	32	..	49	50	608	757	1	1	1	1	
Calbuco . . .	2	9	5	6	13	9	34	23	54	54	927	1011	2	1	1	1	
Dalcahue . .	3	8	6	9	15	8	21	32	40	35	583	719	3	1	1	2	
Quenac . . .	4	6	3	4	10	6	16	7	31	31	381	472	4	0	..	..	
Quinchao . .	5	6	5	8	11	6	20	3	27	31	402	499	5	0	1	1	
	6	8	5	11	17	9	37	..	54	53	498	651	6	1	1	1	
Lemuy . . .	7	8	6	8	16	8	32	23	51	51	721	891	7	1	1	2	
Chonchi . . .	8	9	8	8	16	7	22	25	49	45	598	752	8	1	1	1	
Castro . . .	9	8	8	10	16	8	32	1	51	51	723	866	9	1	1	2	
	10	7	5	9	15	8	24	20	41	44	360	597	10	1	1	2	
Squadrons Cavalry	1	2	1	3	3	2	6	4	10	10	78	110	1	1	..	..	The two squadrons of Cavalry are not efficient, not having as yet horses belonging to them, or arms.
Do. at Maulin	2	2	1	2	4	3	5	..	9	9	108	134	2	1	..	..	
Total . . .		81	61	85	152	82	281	138	466	464	5987	7459	..	10	9	12	

Table C.

Showing the Number of Schools in the Island of Chiloè, the Number of Youths educated, and where situated.

Towns and Divisions.	No. of Schools.	No. of Youths.	Remarks.
St. Carlos . . .	1	70	One School in the capital (St. Carlos).
Chacao	2	40	One in Chacao, the other in Caulin.
Carelmapo . . .	2	115	One in Carelmapo, the other in Maulin (latter on the continent).
Dalcahue . . .	3	208	One in Dalcahue, Jincane, and San Juan.
Quenac	4	50	Two in Quenac, one in Alao, and one in Apiar.
Calcubo	"	"	" "
Quinchao . . .	"	"	" "
Lemuy	3	120	One in each of the Towns of Puqueldon, Alda Chiloè, and Hielmac.
Chonchi	6	305	One in Chonchi, and different other parishes.
Castro	10	363	These are situated in Yutry Castro, Nexion, Putèman, Curague, Llansson, and Quitgmeo.
Total . . .	31	1271	

Number of Vessels, with their Tonnage, which have entered the Port of St. Carlos between the Years 1827 *and* 1831.

Years.	National Vessels.	Tonnage.	Foreign Vessels.	Tonnage.	Total.
1827	15	1572	17	2588	32
1828	15	2081	14	2603	29
1829	27	3485	10	1028	37
1830	19	3617	5	862	24
1831	17	1938	3	670	20
Total .	93	12,693	49	7751	142

TABLE D.

Districts or Towns.	Annual Productions. Fs. of Wheat.	Fs. of Barley.	Fs. of Potatoes.	Botegas* of Cider.	Horses.	Cattle.	Sheep.	Lambs.	Goats.	Mules.	Asses.	Coasting Boats.	Remarks.
St. Carlos	1,130	..	8,250	160	320	770	1,700	500	750	10	3	50	* A botega is a Spanish measure holding 60 quarts English. The wheat, barley, and potatoes are given in Spanish fanegas.
Carelmapo	1,300	..	3,350	300	300	1,200	550	500	45	..	..	10	
Chacao	965	..	5,850	500	220	730	2,870	500	800	..	..	20	
Callinco	4,500	6,000	30,000	1,900	600	2,000	9,000	4,500	600	..	..	1,000	
Dalcahue	5,000	1,000	10,500	4,000	350	600	4,500	1,000	500	..	..	200	
Quenac	3,000	500	10,750	1,800	150	230	6,000	3,000	400	..	..	30	
Lemuy	8,050	1,500	22,500	3,000	650	150	12,000	4,000	350	..	..	28	
Chonchi	6,000	500	1,500	1,000	1,800	1,000	14,000	5,000	300	..	..	17	
Castro	8,900	500	10,000	10,000	1,370	1,610	8,000	3,100	1,100	..	..	90	
Quinchao	10,500	400	26,000	7,000	740	500	14,000	6,000	400	..	..	45	
Totals	49,345	10,400	206,200	27,660	6,500	8,810	72,620	28,100	5,245	10	3	1,490	

IV.—*Expeditions into the Interior of South Africa.*

Two expeditions, each of great interest, have been sent, within the present year, into the interior of South Africa. One has been fitted out under the superintendence of a Committee of Gentlemen residing at the Cape of Good Hope, from funds subscribed for the purpose chiefly in that colony. The other is sent out by the Royal Geographical Society; and is one of two, for which it has obtained the countenance and patronage of His Majesty's Government.

The scale of these two African Expeditions is different, as is, in a considerable degree, their object. That from the Cape consists of a numerous party, well provided with instruments and articles of trade; its object being not so much to penetrate to a great distance beyond the limits of the Cape colony (though, should circumstances prove favourable, it is not debarred from doing this), as to complete the knowledge already gained of the more nearly conterminous countries, and thus enable the Cape merchants more exactly to appreciate their commercial capabilities. That from the Geographical Society, on the contrary, consists of only one adventurous traveller, Captain Alexander, furnished, however, with the means of equipping a suitable party to accompany him from the Cape; and his object is purely that of the pioneer, to push beyond previous lines, and bring away such information (correct, as far as it goes, but comprehensive rather than minute) as may enable other and better appointed travellers to follow in his steps.

In some respects, however, both expeditions are alike. They are both chiefly fitted out at private expense; and while they cannot but both benefit science, they may both also prove means of extending the commercial relations of the country. This last is the avowed object of the first of them; but it has not less weighed with those who have chiefly contributed to organize the second.

The first expedition left the Cape some months ago, under the charge and direction of Dr. Smith, well known in that colony for his talents and acquirements. We are thus enabled to add to the Copy of his Instructions, which we subjoin, the latest information received from him since his departure. Captain Alexander can only now be arriving at the Cape; nor can he even commence his ulterior operations till April next. We must, therefore, be content with merely inserting his instructions.

Instructions to Dr. Andrew Smith, (or the) Director (for the time being) of the Expedition into Central Africa.

"Sir,—In offering to you certain general instructions for the purpose of elucidating their views as to the object and conduct of the enterprise committed to your direction, the committee of management take the earliest opportunity of expressing their confident reliance on your zeal, talents, and experience, as of themselves enabling you to apprehend and provide for the proper object and most beneficial detail in such an undertaking; and they therefore expect that you should not consider yourself bound by any decision of theirs, to adopt or reject, in deference to their opinion, any measures of which their views at present do not coincide with the judgment you may be led to form in your progress.

"They feel certain, moreover, that any measure which you may conceive it necessary to adopt amid the unforeseen occurrences of this enterprise, will meet with approbation from the shareholders. As, however, amid the incidents to be considered and provided for as contingent, the expedition may be deprived of your services, it is the wish of the committee that the intention and the proper course of proceeding, as far as such can be determined at present, should be defined and rendered familiar to the parties composing the expedition.

"It is to be hoped that this may be only the first of a series of efforts prosecuted by the same means, and deriving their support from the same sources; but the fulfilment of this expectation must evidently depend in a great degree on its success. We cannot expect that our limited colonial society should feel justified in supporting any measure tending to sacrifice its valuable members and waste its resources, for objects solely of contingent and distant benefit, should it happen that the consequences of this endeavour confirm the impression of peril attendant on the view generally taken of it. However wide and promising, therefore, may be the views of benefit we entertain as about to arise from the knowledge we may gather, or the means and sources of commercial and scientific enterprise which the expedition may unveil, these views must be held in subservience to the recollection that the unimpeded progress and absolute safety of this one is of paramount importance as a guide, model, and inducement to others: this, therefore, is ever to be kept in view, and first considered in all its undertakings; and any measure obviously unsafe, even though its advantages, supposing it successful, should seem to be many and eminent, ought to be carefully avoided. While our failure would, by its effects on society here, necessarily damp our prospects of future benefit, it is to be apprehended that it would also have a disastrous influence on the natives to be visited. Even disaster from natural causes might diminish the impression of European skill and power; and, acting on the excited superstition of the savage, might quench his desire for our intercourse; and should it arise from the rapacious ferocity of the native tribes, it would erect a more serious obstacle to future progress in their gratified appetite for plunder and their jealousy

of retaliation. These views should inspire especial caution in regard to every proceeding, or even verbal inquiry among tribes where it is to be suspected that such lamentable incidents have already occurred. The impression of its safe advance and return, and of any benefits it may confer on those whom it visits, will unquestionably proceed far in advance of its presence, and necessarily subdue or weaken those obstacles which may at present restrain its proceedings within regions where the colonial influence may be in some respects considered as overlooking its movements and watching for its safety.

"Our inquiries lead us to anticipate that the natives of the interior districts adjoining this colony are generally disposed to welcome the approach of travellers, and to treat them respectfully; lest, however, the opportunity of easily acquiring by plunder what they exceedingly covet should prove too tempting for their respect or caution, it is requisite that such an apparent preparation to repel assault should be preserved as may render it obviously perilous to the assailants; separation of the party must therefore be avoided when holding intercourse with them, and if a division should be unavoidable, the main body must be kept in sufficient strength, and held in readiness to aid the detachments or serve as a refuge for them. It will best accord with the object of the expedition, that not only every reasonable probability of avoiding collision should be shunned, but that all scenes and situations offering any likelihood of its occurrence should be well examined before they are approached.

"It will be inconsistent with any beneficial result, that, in its progress outwards, the expedition should force its way through the territory of any tribe disposed to resist it: if no persuasive means be found of avail to overcome their repugnance, the advance in that direction must cease: it is only in case of the party being itself attacked, or being beset by a force showing an obvious disposition to assail it, and a determination to oppose its progress in any direction, or in case of the defiles of a territory being occupied and closed against its return, that the committee can reckon it justifiable to exercise upon the lives or persons of the natives those formidable means of warfare with which the expedition has been furnished. It will be proper that each individual attached to the expedition should have a determinate station, in which it is expected that he shall be found in cases of emergency; and it will be well that the measures necessary to be adopted should be fully illustrated and impressed upon all by such previous training as circumstances may admit of.

"In regard to the territory the expedition is to visit, there are two methods in which it may arrive at beneficial results: it may either sweep rapidly over a great length of country, with the object of attaining the most distant point which the time allotted to it or the duration of its resources may enable it to reach; or it may leisurely examine in detail, throughout its length and breadth, the condition, capabilities, and productions of a district of more manageable dimensions. The committee conceives that the former might be perhaps the more interesting method of proceeding, on account of the greater

probability of romantic peril, adventure, or discovery; but that these very circumstances of greater uncertainty and danger do, in this case, preclude our aiming at the comparatively barren honour of exciting wonder, and of throwing a partial and obscure light on an extended region. The committee therefore assumes that the last-mentioned of the two courses is, in all respects, more accordant with the views and interests of the subscribers, as expressed in the prospectus; and it therefore recommends that no endeavour be made to penetrate beyond the parallel of 20° south latitude, and that the attempt to reach that parallel be made only if, in the first place, circumstances favour it greatly, and, secondly, if the intervening districts do not afford objects of sufficient interest and importance to occupy the attention of the expedition. The territory limited by that boundary is about four times the extent of the British Islands. It is in truth to be anticipated that the wide regions between the Cape territory and the Southern Tropic will have sufficient extent and variety for the time and resources to be employed in our present undertaking. It will, therefore, be advisable that the expedition consider Klaar Water (Griqua Town), or Lattakoo, as the starting point or base of their operations, and that its first effort be the examination of the district from which issue the northern branches of the Gariep and the streams which fall down to the Indian Ocean: that then the dividing ridge be traced towards the north, leaving it to the discretion of the director to determine at what parallel he should change his course, to the north or west. Our present information leads us to esteem it advisable that the eastern side of the slope be examined first, in order that if the great desert of Challahenga should extend far to the eastward, so as to bar the progress of the expedition towards the centre of the continent, there may remain the unexplored territory along the western slope to occupy its attention in returning. Much of the ultimate importance and interest, as well as the security of guidance and prospect of safe return of the expedition, will of course depend on obtaining an exact knowledge and preserving a faithful record of its route, which can only be done by the aid of astronomical observations made with due regularity and precaution, not only at such stations as form the most interesting features at the moment, in the eyes of those concerned, but at every station where the expedition may rest long enough to permit observations to be taken deliberately, and with due regard to safety both of the observer and instruments. The track of a caravan on land, as of a ship at sea, is defined as well by the less as the more remarkable points through which it passes, and it may very easily happen that stations of the highest interest in a commercial, political, or physical point of view, may, by reason of that very interest, be inappropriate for selection as principal observing stations, either from the attention of every individual being distracted to duties of immediate necessity, or from the risk attending the exhibition of instruments in the unavoidable presence of a rude, curious, and suspicious population. In all such cases it will be proper to connect, by observations of a less elaborate nature,

those stations with others not far distant, which, although less intrinsically important, may be easier of exact determination. The committee would therefore recommend, that stations of observation be classed as either *primary* or *secondary:* those to be considered primary stations whenever the circumstances may appear particularly favourable, by reason of leisure from other occupations, expected duration of halt, and freedom from annoyance, to afford a good determination of the longitude and latitude, such as may serve to render them useful for zero points, to which the secondary stations may be referred, either by dead reckoning of time and distance or by such less elaborate observations as can be obtained at the secondary stations themselves. Of course, however, should circumstances permit, the more important in other respects the point which can be made a primary observing station the better, and the committee would expressly notice Griqua Town, Lattakoo, Kurrechane, and Meletta, as points of which the geographical position should be determined with care by observations on the spot, and the observations then made transmitted home along with the latest communications with the colony. Since, however, the circumstances which may render stations objectionable as primary points are mostly of a moral or political nature, it is expected that no great difficulty will occur in fixing them at positions of especial geographical interest, as at the confluence of rivers, at the extreme borders or on the culminating points of mountain ranges, on remarkable rocks, &c., or at least of determining their bearings and relative situations with respect to such prominent features, with some degree of exactness. A combination of circumstances of this kind of local interest will of course have its due weight in determining (*cæteris paribus*) the halt of the expedition.

" At primary stations the committee recommend the assiduous application of every instrumental means for the determination of the three elements of latitude, longitude, and elevation above the level of the sea; and especially, at such stations, as many series of lunar distances as possible should be procured in addition to the usual sights for time, (or observations of the altitudes of heavenly bodies near the prime vertical,) which, together with meridian observations for the latitude, they would recommend to be practised daily as a matter of regular duty, at every station, as well primary as secondary. At primary stations also the barometer and thermometer should be observed at regular intervals, and the magnetic variation ascertained *by taking the sun's azimuth immediately before and after the observation for time—(noting the exact moments, and thus obtaining data for interpolating to the time of observation).* At such stations likewise a careful investigation of the index errors of sextants should be made, the zero points or index corrections of the sympiesometer should be determined by leisurely comparison with the mountain barometer, (giving time for the instruments to attain the same temperature,) and the difference noted in the observation-books. The necessity of frequent comparisons of these instruments will be apparent if it be considered that in the event of fracture of the barometer tube, no

other means will exist by which the zero point of a new one can be determined. Occultations of stars by the moon, and, if possible, eclipses of the satellites of Jupiter, should be observed whenever an opportunity may occur. The former especially, affording the best known method of ascertaining the longitude by a single observation, should be constantly borne in mind, and the almanac consulted several days in advance, so that no occultation of a large star certainly identifiable should be allowed to escape through inadvertence.

"The committee especially recommend that every observation made should be registered in a book devoted to that purpose, and preserved *in the exact terms of the readings off of the instruments and chronometers*, and kept rigorously separate in its statement from any calculation thereon grounded, and that the observed or presumed index or zero corrections, whether of chronometer, sextant, barometer, or other instrument, should be stated separately in every case, and on no account incorporated with observed quantities, and, moreover, that the observations upon which such index errors have been concluded should also be preserved. Since, however, the guidance of the expedition will necessitate the calculation of many observations on the spot, the results of such calculations should be entered (as such) beside the observation from which they have been concluded.

"The committee further recommend, that the chronometers with which the expedition has been provided by the liberality of his Majesty's Government should on no account be corrected by moving the hands, however great their errors may become, not even in the extreme case of one or both of them having been allowed to run down. In case of such a misfortune (which should be most carefully guarded against, by making it the daily duty of more than one person to remind their bearers to wind them at a stated hour) it will be most convenient in place of setting them, to defer winding them until the hours and minutes come round, at which they may respectively have stopped, as near as may be ascertained from one to the other, or from both, to other watches of the party, and such event, should it take place, should be conspicuously noted in the observation-book; and, as a further and useful precaution, it is recommended to keep some of the best-going watches belonging to individuals of the expedition to mean Greenwich time, by frequent comparison with one of the chronometers. In every case where time is observed, express mention should be made of the chronometer or other watch employed, designating it by the maker's name and number, so that no uncertainty may ever arise as to the proper application of the correction for error and rate.

"The rates of the chronometers should be examined at any station where the expedition may rest two or more consecutive nights, either by equal altitudes of a star, or more simply by noticing the disappearance of any large fixed star from the same exact point of view, behind the edge of a board fixed at some considerable distance in the horizon, and having its edge adjusted to a vertical position by a plumb-line; the interval between the two such disappearances being an exact

sidereal day, or 23 h. 56 m. 4 sec. mean time. Under the head of secondary observing stations may be classed those in which no lunar distances can be got, and when the sights for time and meridian altitude can only be superficially and imperfectly taken, or one without the other. With a view to the connexion of these with the primary station, and to the sketching out a chart of the country passed through, at every primary station a series of angles should be taken with the sextant between remarkable and well-defined points in the horizon, dividing the horizon into convenient portions, and carrying the angles all round the circle back to the point of departure: and in the selection of such points two ends should be kept in view, first, the precise identification of the point of observation, in case of its being desirable to find it again; and, secondly, the determination from it of geographical points. The first of these purposes will require angles to be taken between *near*, the second between *distant* objects. For the latter, of course, remarkable mountain peaks will, if possible, be chosen. Of such, when once observed, the appearances from the place of observation should be projected by the *Camera Lucida*, and their changes of aspect and form, as the expedition advances, should be well and carefully noticed, to avoid mistakes. The approximate distance of any remarkable object may be had by pacing, or otherwise measuring more exactly, a base line of a few hundred paces, in a direction perpendicular to that in which it appears, erecting a staff at each end, and from each staff measuring the angle between the object and the other staff.

"In this manner the neighbourhood of any station may be mapped down so as to be available for many useful purposes. In all such cases the compass bearings of the most important object in the horizon should be taken, and in the absence of the sextant angles, azimuth compass readings of each point may be substituted, though of course with less precision.

"Indications of the progress of the expedition should be left at various points in its course, by making marks on rocks or stones, &c. and by burying documents in bottles. In regard to the latter, it will be necessary to deposit them one foot deep at some known distance, say fifteen feet from a conspicuous surface of stone, on which there is painted a circle containing the distance and bearing by compass of the bottle, from its centre, and that the situation of such places of deposit should also be ascertained by exact compass bearings of several remarkable points in the horizon, both near and distant, as well as by angles between them, carefully determined with a sextant and noted down in the journals of the expedition for their own reference or that of future travellers.

"In surveying the basin of a river, or in proceeding along the prevailing slope of a country, it is very desirable to determine as many points as possible on the same level, and form thus as it were a parallel of elevation to the level of the sea. A line of this kind traced at the altitude of, say 1000 feet, would determine in a considerable degree the physical condition of extensive spaces on the map on both sides of it. The stations of most interest will be found at the extre-

mities of transverse arms of the ridge, or in the central and most retiring points of the intervening spaces. Let the general slope of the country on both sides of such stations, be noted as to its rate and direction; and in regard to the valleys which intersect the slope, let their width, direction, and general rate of declivity, and the section and velocity of their streams, be ascertained, and the probable course of the rivers, as far as it can be determined by the appearance of the country and the reports of the natives, giving them the aboriginal names when they can be discovered. The altitude and acclivity of remarkable peaks or ridges should also be investigated, along with the nature of their climate and of the clouds formed upon them. It will be requisite also to mark with care the nature of the winds and sky as well as the temperature at stations in the neighbourhood, and to note the influence which changes of that description have upon the barometer, and observe also the temperature of deep pools or lakes and copious springs.

"The geological structure of the country is especially worthy of minute and extended observation, and will require that notes be kept of all such appearances as indicate or accompany changes of structure in the formation, or of components in the soil and surface, especially such fossil remains of plants or animals as may occur, and metallic ores, and that proper specimens accompany these notes, ticketed on the spot with precise localities.

"The botanical researches of the expedition will extend to the preservation of specimens of plants not found in the colony, and especially of transportable roots, and the seeds of all such as may be found in a ripened state, noting localities and the varieties of aspect which vegetation puts on in different situations. In regard to other branches of natural history, as it is obvious that after a short experience of research under your direction, almost every one will be able to recognise and preserve what is rare or novel, no further instruction need be given, except the general expression of the desire of the committee that all shall endeavour to secure for the expedition whatever in any department they esteem valuable. it being expressly understood that every article collected by each individual belongs in property to the subscribers to the expedition collectively.

"In regard to the inhabitants themselves, it is of paramount interest to gain an exact portrait of their life as respects their condition, arts, and policy, their language, their external appearance, population, origin, and relation to other tribes, or in general whatever tends to elucidate their disposition, or resources, as sharers or agents in commerce, or their preparation to receive Christianity.

"It will be proper to ascertain their religious traditions or practices, if they have any, distinguishing what is indigenous from the glimmering apprehension of great religious truths which necessarily spreads in advance of the scenes of missionary labour.

"Examine also the state of their intellect generally, as exemplified in their social and political arrangements and common traditions, songs, or amusements, and particularly in regard to their knowledge

of nature, and their notions of its vast and varied proceedings, as thunder, rain, wind, &c.

"Inquiries respecting commerce, and the prospect of its extension, are to be viewed as of no small importance in this undertaking. Every means must be used to ascertain its present nature, channels, and extent, and to determine the existing demand for foreign commodities, and the return which may be expected for them. Proper inquiries may also lead to some satisfactory views of its future condition, as indicated by the wants of the native population, or the objects of most importance to improve their condition, and the corresponding resources for exchange which may arise from a more beneficial employment of their industry.

"Lastly, we may notice the propriety of making inquiries or gathering information with respect to similar enterprises, as whether the natives have traditions of movements of their own, or of the arrival of strangers among them. All that can be gathered respecting Dr. Cowan's expedition will be acceptable in the highest degree. The elucidation of an isolated effort to struggle through the difficulties of African travelling should also be kept in view: it was made by a missionary of the name of Martin, who has not been heard of since he crossed the colonial boundary in December, 1831. He is consequently supposed to have perished in the Gariep, or to have been destroyed on its banks, though as it was his intention to avoid the establishments of Europeans or their lines of communications, there is a lingering possibility of his still surviving.

"The articles fitted for carrying on commerce with the natives have three distinct objects;—First, by keeping up a constant appearance of traffick, to present in their eyes an appreciable motive for this visit to their territory; second, to conciliate favour, or to procure provisions for the purpose of husbanding the resources of the expedition; and third, for the purpose of procuring any profitable articles to carry on to the other districts for the ends abovementioned, or to sell in the colony at the termination of the enterprise. In regard to these the Committee has to remark, that attention to the two first-mentioned objects is indispensable, from its necessary connexion with the safety and efficiency of the expedition, and that the third is to be contingent on the acquisitions of the party in regard to its main object of collecting information as to the country, and securing what illustrates its natural history and resources, and on the state of its means of transport. The Committee therefore recommend that this third object be attended to only in case that it be necessary to send waggons back for supplies, or in case that in the homeward progress of the party there be room for such articles without incommoding it in its other operations.

(Signed)	Thomas Wade, Chairman,	A. J. Cloete,
	J. Herschell,	C. F. H. von Ludwig,
	A. Oliphant,	F. S Watermeyer,
	James Adamson, D.D.	John Centlivres Chase,
	T. M'Lear,	*Hon. Secretary.*

June 23rd, 1834.

Report of the Committee of Management of the Cape of Good Hope Association for exploring Central Africa.

The Committee has much pleasure in announcing to the Subscribers, the recept of despatches from Dr. A. Smith, dated the 23d of September 1834, at Caledon River.

From these documents it appears that the journey from Graaff Reinet to the frontier of the colony, was attended with much hindrance and trouble, owing to the severe *drought* which has long been experienced in that part of the country, and, it is understood, has extended very far beyond the colonial boundary.

Upon the arrival of the exploratory party at Philipolis, a missionary station belonging to the London Society, and the assumed capital of the Griqua chief, Adam Kok, situated about twenty-five miles to the north of the Nu-Gariep or Black (Orange) River, Dr. Smith, from the information he there obtained, decided upon taking an easterly route, as the only one at that period practicable, the drought preventing a safe access, with ox waggons, to the Bechuana town of Latakoo, on the Kuruman River, which it had been proposed to make the starting point of the expedition.

Had, however, this difficulty not intervened, Dr. Smith considers it highly probable that he should have decided to adopt his present intended route, inasmuch as it is extremely desirable that the district between the two principal branches of the Orange River should be investigated, not only from its contiguity to the colony, but from the promise it holds out of very considerable and interesting additions to our scientific knowledge.

The party, therefore, thirty in number, were to cross the Caledon River on the day subsequent to the date of the despatches, for the purpose of tracing up, in the first place, the country situated between the Caledon and Stockenstrom Rivers to their respective sources, thence to explore the origin of the Mapoota River, which it is believed takes its rise eastwardly of the same Highlands, and falls into De La Goa Bay; and having completed that survey, to stretch across the country westward to the Ky-Gariep or Yellow (Orange) River, following it down to its confluence with the Hart or Malalareen, somewhere about lat. 28° 10′, long. 24° 35′, and where they would arrive and communicate with the colony *viâ* Philipolis, in the month of December. At this point it was intended to ascertain from the Rev. Mr. Moffatt, the intelligent missionary at Latakoo, the state of the country northward, and the prospects of the expedition; to bring together the stores laid up in reserve at Philipolis; and there finally to arrange the route of the party for its northerly destination, which it was expected would then be open in consequence of the periodical fall of rains, which would render the country traversable by oxen.

In the prosecution of the preparatory excursion eastward, Dr. Smith anticipated much interest and gratification. By native testimony he was assured that the wide Caledon issued at once a perfect river, from an enormous spring, on the side of a high mountain, where it was

nearly as large as at the place where he was then encamped; the probability of which singular circumstance may be credited, from the fact that the river at New Latakoo, the Kuruman, gushes, in like manner, from its rocky fount, a noble stream, and is at no part of its subsequent course of greater size. His route lay first to Massus, king of the Basuta tribe of Bechuanas; thence to the once formidable, but now subdued Mantatees; and after that to the Kraal of a large, but little known, tribe, where twenty-five chiefs were reported to reside. He was in the immediate vicinity of the Agate Hills, which supply the Orange River with those well known and beautiful gems, and he had reason to believe that he would be able to investigate the porphyritic formations of its sources, of which so many splendid specimens strew the course of that stream. There was also considerable prospect of a large supply of ivory obtainable in this route, as a return for the trading part of this expedition.

The following memoranda of the acquirements of the expedition are attached to the despatch:—

About three hundred and fifty specimens of birds, quadrupeds, &c., have been preserved.

Fifty drawings have been completed.

The history of three Bechuana tribes, viz.: Batlapee, Barralong, and Baclarou have been minutely investigated.

A map of the route from Philipolis to the Caledon River, has been constructed.

The latitude and longitude of eleven stations have been ascertained; —the geological characters of the country, between Graaff-Reinet and this station, have been minutely investigated; numerous specimens of rocks have been collected; and the heights of many of the mountains and hills, both within and beyond the colony, amongst others, the Compass Berg, have been taken.

Instructions addressed to Captain Alexander.

"Sir,—The council of the Royal Geographical Society of London having intrusted to you the conduct of an expedition of discovery in South Africa, furnish you with the following instructions relating to it, confining themselves therein to the more important and essential conditions of the undertaking, and leaving the minor arrangements to your own discretion. They will, however, transmit to you hereafter such memoranda and notes of information, or advice, as may seem likely to be useful for your further guidance.

"The interval of seven or eight months which will be spent in the voyage out, or in residing at the Cape, may be advantageously employed in acquiring expertness in the use of the astronomical and other instruments, and in studying the Sichuana language.

"It is hoped that you will be conveyed in one of his Majesty's ships of war to Dalagoa Bay, where it is not desirable that you should arrive before the termination of the rains, or the beginning of May 1835.

"The general object of the proposed expedition, is to explore the river Manice, which flows into Dalagoa Bay, (and which is named by the English King George's River, by the Portuguese and other nations Rio del Espiritu Santo), so as to ascertain whether or not it be identical with the river of the interior which the Bechuana call the Mariqua.

"The furthest point of this river explored by Captain Owen, is in lat. 25° 21′ 10″ S., and about long. 32° 51′ E.; being about fifty miles from the mouth along its course, but not more than eight from the nearest point of the sea-shore. It may, therefore, be advisable to land on the coast in about lat. 25° 27′ S., and then to strike in towards the river, so as to avoid the labour of making up against the stream, as well as abridge materially that part of the journey which would conduct through a low alluvial soil.

"On your arrival in the bay, your first care will be to select a guide and interpreter, from among the chiefs if possible: this business, with the procuring of bullocks to carry your baggage, the choice of a place of debarkation, &c., may occasion a delay of a few days; but promptitude in the selection of your plans, which will materially result from previous diligence in collecting information, and the most despatchful execution of them, consistent with prudence, are especially recommended to you, as delay on the coast is likely to give rise to numerous unforeseen difficulties.

"The most northern point of the river Mariqua seen by Messrs. Scoon and Leckie, is, probably, in lat. 24° 50′ S., long. 28° 30′ E., and, consequently, about 300 miles in a straight line from the farthest explored point of the Manice. If the former of these rivers communicates with the latter, the unexplored portion of the connected stream may possibly form a circuitous course of 360 miles, or six weeks' journey; but how far it may be advisable to shorten the route by leaving the circuits of the river, and proceeding directly to its upper reaches, as they may be indicated by the natives, will be best determined by the circumstances which arise in your progress. It would, indeed, be highly desirable to learn the character of the river, and to what extent and in what manner it is navigable; but this consideration must be held subordinate to that of safety, in providing for which, it will, perhaps, be found expedient to follow the most frequented routes, and the line of densest population. The Mariqua once reached, the difficulties of the journey may be considered overcome, and a few days' march southward will conduct to a missionary station.

"The council expect that you will keep an exact register of all astronomical and meteorological observations, and that you will note carefully the variations of the compass, and the bearings and estimated distances of every remarkable object in view.

"In your intercourse with the natives, you are recommended to maintain a deportment at once resolute and confiding, to avoid associating with any but chiefs, and to accept, and even press them to an exercise of that hospitality which they regard as a moral obligation.

"You are requested not to neglect any opportunity which may arise, in the course of your journey, of despatching to the Society's correspondent at the Cape, to be forwarded to the Society, an assurance of your safety, and an account of your proceedings.

"The council place at your disposal a letter of credit on Messrs. Borradaile and Thompson, at the Cape, for 300*l.*, which sum it is expected will be sufficient to defray the expenses of guides, interpreters, the journey through the colony, and the passage home to England, as well as to purchase such small additions as may hereafter appear necessary to be made to the stock of merchandise with which you are already provided.

(Signed) W. D. Cooley, *Hon. Sec.*

To the Committee appointed to organize the Expedition.

V.—*Reports on the Navigation of the Euphrates.* By Captain (Colonel) Chesney, R.A. London 1833.

We believe we may announce that, as the present sheet goes to press, the last remaining difficulties which delayed the departure of the expedition about to endeavour to establish steam navigation on the Euphrates, are in the course of removal; and that its persevering leader is to reap the reward of his labours and exertions, by being allowed to make his experiment in his own way. And we most sincerely rejoice at this. Without presuming to offer any opinion on what may appear to us to be the probabilities or improbabilities of the substantial success of the enterprise, it is impossible not to sympathize with the zeal and confidence which animate the adventurous party engaged in it; and an expedition by which science must gain, whatever may be otherwise its results, is entitled to the especial good wishes of a literary and scientific journal.

We have another duty, however, to perform with regard to Colonel Chesney, than merely wishing him success; and we enter on it with the more unwillingness, that we are alike afraid of making too much, and too little of it. In an analysis of his Reports on the Navigation of the Euphrates, which appeared in this Journal last year, he has found a doubt expressed, as to the extent of river which he himself examined; and also a disposition, *as he thinks*, to place his account of it in invidious comparison with that of a previous traveller. He has, accordingly, criticised that analysis, in a private communication to the Council of the Royal Geographical Society, with some warmth of feeling; and thus compels us to offer explanations which we should otherwise think unnecessary. That the article in question was not meant to injure him, he himself readily admits; and that it has not done so seems best proved by his present triumph over much more formidable criticism.

The author of the Paper in question now willingly admits that he mistook Colonel Chesney's expressions, in his Reports, regarding the extent of his personal examination of the river; and he authorizes the insertion of the following, which are his own words in the communication adverted to, in order to correct that mistake:—"My first examination," says Colonel Chesney, "commenced at El Kaim Tower, and extended thence to the sea, a distance of 900 miles. My second journey (see pp. 61, 62) took in the sources of the Euphrates, and a considerable part of its course above and below Bir; as well as the ports of the Mediterranean, and the country between them and the river. So that the only portion not actually examined by me is the small space between the bend at Giabar and El Kaim Tower."

But while Mr. Long is thus willing to rectify any mistakes into which he may have fallen regarding matters of fact, he is more tenacious of his accompanying criticisms. He thinks it almost unnecessary to deny that in writing the article in question he had any bias against Colonel Chesney; on the contrary, he regarded him then, and regards him still, as every geographer must regard the intrepid traveller who exposes himself to a thousand forms of danger to increase the means by which geography may be improved. But he cannot waive his right to compare new statements with old ones, whatever their respective authority, and to draw such conclusions from the comparison as may seem to him best founded: and though, were he to write the article now, with his better means of information, he might modify some of his conclusions, and revise the expression of them, yet his opinions on most of the points at issue remain substantially the same; and he thinks that a more careful comparison of the text of the old authors with the existing localities will yet convert Colonel Chesney himself at least to some of them.

We desire, moreover, ourselves to testify that so little was Mr. Long aware, when he sent his paper to the Journal, that it contained matter of offence, it was his particular wish that it should be communicated to Colonel Chesney before publication; which was only prevented by that officer's absence in Ireland. But we trust that enough is now said to satisfy all parties.

The expedition will sail, within the present month, in the George Canning, of Liverpool; which is chartered to convey it to Scanderoon, whence it is hoped that the iron-boats, and other *materiel*, may be transported without much difficulty across the Desert. But if, from the political state of the country, or other unexpected obstacles, this is found impossible, the same ship is under articles to re-embark the party, and carry them direct to Bombay.

VI.—*Altitudes of Places in Kumaon.* By Capt. W. S. Webb, E.I.C.S.

A List of Latitudes, Longitudes, and Altitudes of many Places in Kumaon, has appeared in the 'Asiatic Researches,' presented to the Society by Lord Hastings, for whom a short Memoir of the Survey was drawn up in 1817, while the work was yet in progress. Perhaps this publication was premature; but be that as it may, it was clearly indicated in the memoir itself that two corrections would eventually be required; the one affecting *all* the longitudes, and the other all the *geometrically-deduced* elevations in that list.

The longitude of Péleebheet, as given by Mr. Reuben Burrow, 79° 41′ 45″ E. was taken, *pro tempore*, as the first meridian of the survey, though well known to err in defect seven or eight minutes; and I take the present opportunity of mentioning that the correction in longitude + 8′ 39″, which has been adopted in the map, is applicable to all the longitudes given in the 'Asiatic Researches,' including Péleebheet.

In the second place, and which is more immediately connected with my present purpose, the altitude of Kasheepoor (upon which as the zero of my observations, all the geometrically-deduced elevations in the survey are based,) was assumed from a mere estimate to be 650 feet. But since then many barometrical observations have been made at that place, (as will be seen in the annexed Table,) the mean result giving 722 feet for the difference of elevation between Mr. A. Colvin's house at Calcutta, and the station at Kasheepoor. The heights inserted in the map have been thus increased seventy-two feet, the correction indicated, which is also due to every altitude, as given in the 'Asiatic Researches,' if obtained by *geometrical* process. The height of Mr. Colvin's house above the level of the sea, though probably not much less than 100 feet, has not been taken into consideration, and the altitudes given in the following Table are those above Calcutta.

Having been occasionally referred to upon the subject, it seems desirable to place the whole of the barometrical observations made in Kumaon upon record, that the traveller in the mountains may have an easy mode of access to them, whether merely to gratify his curiosity, or for any purpose of utility.

It was not until a late period of the survey that barometers in serviceable condition were obtained, though neither trouble nor expense were spared to procure them; all were broken upon the road, until, in April, 1817, being then in camp at Gungolee-Hath, I received from a friend a portable barometer by Ramsden. The instrument was originally intended for measuring such heights as occur in Great Britain. I managed, however, to get the scale lengthened downwards by a native workman; there was no contrivance for viewing the surface of the mercury in the reservoir from without, or of adjusting it to the beginning of the scale. The irregular form of the interior of the reservoir,—a cylinder having a broad and shallow cup at either extremity,—rendered it extremely difficult to be

gauged. Near the upper surface, 13 inches in the tube were equivalent to only $\frac{1}{10}$ of an inch in the reservoir.

It was subsequently ascertained, by comparison with a barometer of the best description, that the tube had been truly filled, and the scale precisely adjusted. All the observations, from No. 1 to No. 138, inclusive, were made with this instrument only, and must be considered *approximate* results. In computing the altitudes from these, no equation has been applied to correct the place of the zero point, and that usually added to the length of the column of mercury in the lower temperature (to compensate for expansion,) has also been omitted. The one being always additive to, and the other, almost without exception, subtractive from the *result*, have a tendency, *pro tanto*, to compensate for each other.

At the time these observations commenced, no corresponding series at Calcutta was procurable, I was, therefore, obliged to adopt the mean height of the barometer and thermometer at noon, for each month of the year, as inferred from the Meteorological Diaries, which had been formerly kept at the Presidency and published in the 'Asiatic Researches,' in lieu of correspondent observations. The variations to which these are liable in different years in Bengal are so small, that they might indeed be used without risk in all cases where very great accuracy is not required. The altitudes themselves, as far as subsequent observations made with better instruments show, appear to be generally a little in defect; but upon the whole, I am of opinion that the difference between the approximate altitudes here given, and those which could have been obtained by the best barometer, and more rigorous computation, all other things remaining the same, will rarely, if ever, exceed 100 feet.

In the spring of 1818, I obtained a supply of five barometers of the best description, and in perfect order from Europe. Four of them were constructed so as to admit of the adjustment of the zero point; and the fifth, a small instrument of Sir H. Englefield's pattern, required an equation of $\frac{1}{50}$ in lieu of that adjustment. Among the observations which follow, those marked (*a*) were made with the latter instrument exclusively, and the value of the equation just mentioned is included in the *last* column.

About this time I heard that Mr. Alexander Colvin, of Calcutta, kept a Meteorological Diary, and having made application to him upon the subject, he most kindly consented to supply me, monthly, with a copy. This gentleman's diary was kept with such undeviating regularity, and was transmitted to me during the residue of my survey with such punctuality, as to render it invaluable for my purpose; and his polite and liberal attention demands my grateful acknowledgment. I am also indebted to Major General Hardwicke for occasional extracts from his diary kept at Dum-dum.

Generally speaking, I have preferred taking the mean of the Calcutta observations for five days, to that immediately corresponding with my own. Thus, an observation made in the mountains on the 10th of any month, would be computed with the mean of those by Mr. Colvin on the 8th, 9th,

10th, 11th, and 12th. I feel convinced, that almost every instance, in which any material discrepancy appears in a result deduced from more than one observation, the error is attributable to the "Equation for Temperature," the theory being, I believe, generally considered imperfect.

In steady weather, series of observations gave the same results, as nearly as possible, though made at very different seasons of the year. But the continual travelling about, which the survey required, seldom permitted observations to be made in a continued series, and made it unavoidable to register a great number which were taken when the weather was unsettled. A fall of rain will often, in particular situations in the hills, depress the temperature 10 or 15 degrees in a few hours, a circumstance which does not occur in Calcutta, though similar weather be experienced, and this, if it be a lofty station, seriously affects the altitude. The barometer meanwhile seldom varies, as dependent upon rain or even snow, and any trifling alteration which may take place in that instrument, is often contrary to what might be expected from a diminution of temperature.

The unequal variations of temperature at places *within* the mountains, and near to each other,—if differing considerably in altitude,—is still more remarkable; and corresponding simultaneous observations at two such stations would give results fluctuating between extremes more widely removed, than would limit the differences apparent in the calculations if separately compared with the Calcutta observations. The tendency of the barometer to rise and fall (at every place where I have had an opportunity of observing it for several days together) appeared to me to correspond, almost precisely, and from day to day, with the Calcutta instrument; the *general changes* of temperature are analogous also. Such instances, as I have alluded to above, are to be considered as exceptions only.

Upon the whole I am of opinion that if a series of barometrical levels could be carried on step by step from the plains to the passes of the Himaleea, (which by the way would exclude all other business,) and with that account, unavoidably, every individual error accumulated from unequal variations of temperature, and a multiplicity of other causes, the ultimate object of inquiry would not be attained with nearly an equal degree of precision to that derived from comparing *directly* the last observation of the series with one correspondent at Calcutta. By the latter mode no error is extended to a second station; and, as the barometer in India is not affected by changes of weather, &c., as in places more distant from the Equator, and as its diurnal and annual variations in the hills correspond with those observed in Calcutta, the *distance* between the places of observation furnishes of itself no argument that I am aware of, unfavourable to the greatest accuracy which this instrument is competent to afford.

In such a multitude of figures there must inevitably occur many errors, and the more so, as not one of the results have been ever recomputed, or examined by a second person. The state of my health precludes me from executing now any extensive revision, and I can only express a hope that the inaccuracies may not prove unreasonably numerous.

COMPUTATION OF THE ALTITUDES.

The altitudes from No. 1 to No. 138 inclusive, have been computed according to a rule given in the pamphlet usually delivered with Sir H. Englefield's portable barometer, descriptive of the use and application of that instrument.

The residue are calculated by the formula contained in a small but useful publication, entitled 'A Companion to the Mountain Barometer,' by Mr. Thomas Jones, optician, of Charing Cross.

The following are a few examples of the latter class, given somewhat more at length. In every case, where it was possible to do so, the observation was delayed until the instrument had taken the temperature of the atmosphere; and in the Calcutta observations no registry of the detached thermometer is included.

Date.	Place of Observation.	Barom. Mean.	Therm. A.	Therm. D.	Place of Comparison.	Barom.	Therm.
1818			°	°			°
Feb. 19	Kasheepoor (Factory)	29·048	70	70	Calcutta, Mr. Colvin's house	29·85	73
,, 20	,, ,,	·016	68	68	,, ,,	·91	72
,, 21	,, ,,	·168	68·5	68·5	,, ,,	·94	78
,, 22	,, ,,	·138	68	68	,, ,,	·91	78
,, 23	,, ,,	·109	66	66	,, ,,	·96	80
	Mean .	29·096	68·1	68·1		29·914	76·2
		Centigrade 20°				Centigrade	24·5

B.	H.	A.	D.
		°	°
29·914	929	24·5	24·5
29·096	..	20	20
+ ·026	..	4·5	44·5
29·122	1628	× ·0058	22·2
	699	·290	3·0
	+ 66·6	·232	66·6
	765·6	·02610	

Altitude of Kasheepoor Factory Bungalow, 765·6 feet.—See No. 142.

II.

At Keoonlung, a halting ground, near Neetee Pass, mean of Two Days' Observation, on the 20th and 21st of August, 1818.—See No. 263.

B.	H.	A.	D.
		°	°
29·485	1,305·5	26·1	26·1
17·542	..	11·	11·7
·050	..	14·4	37·8
17·592	14,762	·0035	18·9
	13,456·5	720	57·5
	1,086·75	432	945
	14,543·25	·05040	1323
			945
			1086·75

Altitude of tent at Keoonlung, 14,543 feet.

III.

August 21st, 1818, an Observation, at Crest of Neetee Pass, compared with the Barometer at Keoonlung, one hour and a quarter afterwards.

	B.	H.	A.	D.
			°	°
	17·542	14,837	12·2	12·2
	16·270	..	8·3	8·3
	·013	..	3·9	20·5
	16·283	16,778	·0033	10·25
		1,941	117	8·3
		+85·08	117	3075
Diff. Altitude =		+2,026·08	·01287	8200
Keoonlung.. =		14,543·25	..	85·075
Altitude .... =		16,569·33		

Altitude of Neetee Pass, 16,569 feet. See No. 264.

IV.

Crest of the Pass compared with Major General Hardwicke's Diary.

B.	H.	A.	D.
		°	°
29·51	1,283	28·5	28·5
16·27	..	8·3	8·3
·065	..	20·2	36·8
16·335	16,694	·0032	18·4
	14,411	404	65·9
	1,212·56	606	1656
	16,623·56	·06464	920
			1104
			1212·56

Altitude of Neetee Pass, 16,624 feet. See No. 265.

V.

At Sireenugur Bungalow, 2d October, 1819. See No. 483.

	B	H.	A.	D.
			°	°
Mr. Colvin's Observation =	29·75	1,072	31·1	31·1
	27·948	..	30	30
	·006	..	1·1	61·1
	27·954	2,695	·0056	30·5
		1,623	·00616	6·9
		+210·45		27·45
		1,833·45		1830
				210·45

Altitude of Sireenugur Bungalow, = 1,833 feet.

VI.

The same Observation compared with one simultaneous at Paoree, the Altitude of which place, by mean of numerous Observations, is 5,238 feet.

	B.	H.	A.	D.
			°	°
	27·948	2,701	30	30·
	24·685	..	20·6	20·6
	·046	..	9·4	50·6
	24·731	5,887	·0049	25·3
		3,186	846	13·6
		+344·08	376	1518
Below Paoree.. =		−3,530·08	·04606	759
Paoree .... =		5.238		253
		1,707·92		344·08

Altitude of Sireenugur Bungalow, 1,708 feet. See No. 482.

VII.

A tent near Chundurbudunee Temple, 6th, 7th, 8th, 9th, and 10th of October, 1819.

B.	H.	A.	D.
		°	°
29·797	1,031	28·9	28·9
23·318	..	19·5	19·5
·014	..	9·4	48·4
23·362	7,371	·0047	24·2
	6,340	658	27
	653·4	376	1694
	6,993·4	·04418	484
			653·4

Altitude of tent, 6,993 feet. See No. 487.

VIII.

The same compared with simultaneous Observations at Paoree, on the 8th, 9th, and 10th October, 1819.

	B.	H.	A.	D.
Chundurbudunee	23·306	7,433	20°	20·°
Paoree.........	24·765	..	18·9	18·9
	·005	..	1·1	38·9
	24·770	5,846	·0050	19·4
		+1,587	·00550	6·7
		+129·98		1358
	Paoree ...	5,238		1164
		6,954·98		129·98

Altitude of tent, 6,955 feet. See No. 488.

ROUTES

During which the following Observations have been made with the Barometer to determine the Altitude of Places.

The frequent recurrence of places bearing the same name, in Kumaoñ, would make it extremely difficult for a traveller to identify, in the map, those contained in the following list; many of them could not be inserted there at all for want of space; and the *prodigious number* of names (not easily legible in the original on account of the shading) which are rendered quite unintelligible in the engraved copy, greatly enhances this difficulty, which it is hoped the following clue to the routes, upon which they occur, may tend to diminish.

No. 1. Pokhuree, Lat. 29° 39½′ N., Long. 80° 5½′ E.

The route leads viâ Bagha Ling Temple, (12,) and proceeds into Juwahïr along the course of the Goree R. to Milum, (36,) thence returning to Raňtee, (44,) turns westerly, crossing Surjoo R. at Soopee-Ford, (60.) SW. to Byznath and Runchoola, (77,) and by Gunna Nath, (83,) to Kalee Muth and Almora. From Kalee Muth E. to Chanee-Soopéh (92) and Sym-Deo, N. to Khuréh, returning by Doongralékh to Boodha-

Jagésur, (100,) Shem Deo, (111,) SE. by Jindee to Rameshur, (108,) thence returning by Chakhan to Almora. From Almora by Bandunee P. and Thath, (114,) thence SSW. through Beesjoola Purguna (not yet published) to Nanukmuth, (133,) in the Forest Péleebheet and Kasheepoor.

From Kasheepoor, (140, &c.,) by Nujeebabad, (176,) to Kotdwara Pass, (178-9,) Lungoor Fort, (182,) Muha Bulee Temple, (188,) Northward to Oonchakot, (198,) and the Nyar R., (134,) to Oolka, (209.) (Nos. 135, 136, 137, 138, will be found between the two last-named places, being misplaced in List.) The route proceeds to Sireenugur, (212,) crosses the Aluknunda R. through Sindooree, (213,) Agustmoondee, (219,) &c. to Kedar Nath, (228,) thence return by same road to Ookee-Muth, (235,) cross Toong Nath Ridge, (239,) by Gopésur, (242,) to Peepulkotee, (244,) and Josee Muth, (247,) a detour southerly by Pilgoénta Ridge, (250,) to Pana, (252,) back from thence to Tooonghasee, (280,) and along the Dhoulee R. to Neetee Pass, (264.) Return by same road to Tooonghasee, Josee Muth, (284,) Gopésur, (293,) W. to Nyl and S. to Déothula Temple, (299,) to Agur Peak, (303,) cross Ganges R. at Bumot, (306,) turn westward to Hurecalee Temple, (310,) thence viâ Gopheer, (311,) and Bunraree Temple, (318,) to Oolka Gurh, (320,) Sireenugur, (321,) and south to Paoree, (322.) From Paoree ESE. to Kuneoor, (332,) SE. to Tamadhond (338,) and Boodha Kedar, (339,) westerly to Kulwaree, and along course of Sanee R. to Ooklét, thence by direct road to Kotdwara (355,) and the Plains. Re-enter the Hills at Kotdwara, and proceed thence by Bilkhét (388) on Nyar R. and Doomkot-Khal (397) to Paoree.

The next route commences with a circuit between Paoree, Oolka-Gurh, and Soomaree, proceed to Chipul-Ghat R. See Talgaon, (419,) SSE. from Oolka upon that stream. Various traverses upon upper part of Chipul-Ghat R. up to Bunas, (440,) thence the route turns E., passes through Sont, (444,) returning by a circuit to Bunas; thence in a direct line upon Roodur-Prag as far as Biraon, SW. to Déwulgurh, (468,) and by Soomaree (469) to Paoree (472 to 480.)

The next route commences from Sireenugur, (482,) viâ Chundurbudunee, (489,) to Deoprag, (492,) to confluence of Nyar R. with the Ganges, (495,) along the former stream to Bilkhét, (499,) and junction of Chipulghat R. turning NE. to Dhour-Boonga, (501,) NNW. to Doomkot, and thence again ESE. by Choundkot, and Guwanee, (513,) to Déba Temple, (518,) crossing Sanee R. about SbE. of the latter place to Tulaen, (520,) on Lukhor River, thence in nearly same direction to Bunduran, (524,) on Ramgunga R., and crossing the ridge separating that stream from the Kosee R., reach the latter river at Mohan, (525,) follow its stream to the Plains viâ Dhekulee, (526,) and on to Péleebheet, (531.)

Re-enter the Hills at Timla Pass, (535,) to Chumpawut and Fort Hastings, (541,) viâ Deo Dhoora, (542,) Birar and Jak, (545,) to

Hawul Bagh, (546.) Descend Kosee R. to Dhekulee, and by Kath-kee Nao, (557,) Choumoonh, (562,) and Reonee, (570,) to Kalee-Muth, (571,) thence to Nyathana, (574,) Dwara Hath, (576,) Doona Giree, (577,) onwards NNW. to Loba Gurhee, (581,) in same direction, to Khetee-Malsee, (582,) Chandpoor and Kurn-Prag, returning thence to Kirsal, and Dhunpoor Dobree, (591,) which terminates this tour.

Then follow some observations on the Plains, and on the lower part of the Kalee or Gogra R. to (No. 603.)

The next route begins at Dharee Rope Bridge, (605,) about six miles eastward from Sireenugur, ascending the Mundagnee R. as far as Naluhputun, (617,) returns eastward of that river to Suteear and Agur Peak, (628,) by Deothul Temple to the Ganges near Kundara, and westward of the river by Booransee Peak to Gopesur, (637.) Cross Aluknunda R. at Peepulkotee Bridge, along left bank of river to Kurn Prag, (642,) SW^y. by Chandpoor-Pindooalnee, (644,) Murora, (647,) to Kunoor, (649,) SSE. by Meldhar, (652,) to Jooneea Gurh, (657,) NW. to bank of Sanee R. near Dhaond, and descend with its stream to Pukholee, (665,) southward by Bhoun, (667,) to Kuman near Ram Gunga R.; thence NW. to Kulwaree, and westerly by Seela (679) to Danda Mundee (680.) Trace course of Heonla R. NW. to Timlee, (684,) returning to Keecha Gurhee, (692.) Cross Nyar R. at Murora Ghat, (695,) Situn Temple, Mujeen Temple, (706,) near Sireenugur, and thence by Keeark Temple (707) to Paoree.

To Talgaon on Chipulghat R. (bearing from Oolka Gurh SSE. six or seven miles,) and having ascended that stream NE^y. to Boonga, turn SSW^y. reaching Sanee R. at Kubura, (714,) near Kukhtoon, up the stream to Kulwaree, (716,) and confluence of Lukhor R. (718) with it at Pukholee. Eastwards along the former stream to Soongureea and Nagnee, thence S^y. to Khurgéth Peak, (721,) confluence of Nyr R. with Ram Gunga (722) at Séra, up the Ram Gunga to Bikeea-kee-Syn, (725,) Boodka-Kedar and Masee Temple, (727,) back to Bikeea-kee-Syn, and ascend Ghugas R. to Teepoula, (729,) thence viâ Koomhpoor to Baṅslee, (733,) by Somesur on Kosee R. to Byznath, (735,) to Chiringa on Pindur R., (736,) Budhan Gurh Fort, (737,) Koolsaree, (146,) Sir-goor Temple, (147,) Bugolee Seera, (148,) to Kurn Prag, (149,) the last four numbers being accidentally misplaced in the catalogue. No. 150 is on the Ganges about midway between Kurn Prag and Roodur Prag.

Nos. 151 to 163, both inclusive, are near Bhudree-Nath and Mana Pass to Tartary. Nos. 164 and 165, on Aluknunda R. (or Ganges.)

Nos. 166 to 174 will be found SW. of Almora in the direction of Roodurpoor.

APPROXIMATE ALTITUDES of PLACES and STATIONS in KUMAOÑ, from Barometrical Observations made, during a Survey of that Province, by Capt. W. S. WEBB.

No.	Place of Observation.	Observation.		Comparison.		Approximate Altitude. Fathoms.	Equation for Temperature. Fathoms.	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Therm.	Barometer.	Therm.				
			°		°				
1	Pokhuree (village)	25·39	75·5	29·86	82	704·27	80·25	4,707	G.* 4,784.
	Birgolee Ghat, on Ramgunga R.	27·72	66½	29·83	82	318 6	32·88	2,109	
	Koosaél (village 80 ft. below tent)	26·28	77	29·81	85	547·37	65·45	3,677	
	Stream below Boonga (Barûh Bishee P.)	25·65	75	29·81	85	652·75	76·44	4,375	
	Jumtur (village 60 ft. below tent)	25·33	76	29·81	85	707·27	83·7	4,746	
	Shéra (village 70 ft. above tent)	26·07	81½	29·81	85	582·21	72·73	3,930	
	Crest of Ghatee, between Shera and Shémar	21·56	68	29·81	85	841·34	91·35	5,596	
	Station near Mujgaoñ	24·633	77	29·81	85	825·35	98·67	5,544	G. 5,657.
	100 ft. above junction of Dokuhna N. with Ramgunga R.	26·92	96	29·81	85	442·87	63·22	5,037	
10	Bulteer (village)	26·81	89	29·81	85	460·65	61·81	3,135	
	Station above Nunpapoh	24·0	74	29·78	87	937·14	110·9	6,282	
	Bagha Ling Temple	22·85	64	29·78	87	1,150·39	122·1	7,635	G. 7,718.
	Sath (village)	24·64	74	29·78	87	822·84	97·37	5,521	
	Dingathur Temple	25·78	73½	29·78	87	626·42	73·75	4,201	G. 4,518. (?) By another barometrical observation, 4,190 ft.
	Moonsheearee (station)	23·59	80½	29·74	90	1,006·13	130·6	6,820	Mean altitude 6,799 ft.
	Do. do.	23·53	70½	29·74	90	1,017·19	119·6	6,821	
	Do. do.	23·56	66½	29·74	90	1,011·66	114·1	6,755	
	Renguleea, on Ramgunga R.	27·12	83	29·74	90	400·51	53·26	2,723	
	Nachunee (village)	26·65	88½	29·74	90	476·44	66·49	3,258	
20	Teejum, bridge on Ramgunga R.	26·82	92	29·7[illegible]	90	448·82	64·61	3,081	
	Girgaoñ (village)	23·80	80½	29·74	90	967·64	125·6	6,559	
	Majkot (village)	25·75	88	29·74	90	625·64	87·01	4,276	
	Munguleea (Bhoteea halting ground)	22·76	78	29·74	90	1,161·69	147·4	7,856	
	Jym Ghar Bridge	25·07	87	29·65	87	728·71	97·79	4,959	

* The geometrical result.

Approximate Altitudes of Places and Stations in Kumaoñ.

No.	Place of Observation.	Observation.		Comparison.		Approximate Altitude, Fathoms.	Equation for Temperature. Fathoms.	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Therm.	Barometer.	Therm.				
			°		°		+		
	Leepoo Kee Than	21·64	69	29·65	87	1,367·68	153·5	9,127	
	Dhurmsalu (on Lesser Ruñr Ghar)	22·56	72	29·65	87	1,186·86	137·6	7,947	
	Bridge over Greater Ruñr Ghar	23·39	57	29·65	87	1,029·95	100·5	6,783	Confluence with Goree R. 15 ft. below.
	Confluence Bugdwar and Goree Rivers.	22·51	77	29·65	87	1.196·5	146·05	8,055	
	Camp on Goree River above Snow	21·00	52	29·65	87	1,498·06	137·1	9,811	
30	Reelakot (village)	20·37	50	29·65	87	1,630·34	145·2	10,653	
	Murtolee (village)	19·98	70	29·56	84	1,701·09	186·8	11,327	
	Bridge on Nundeejah R.	20·45	59	29·56	84	1,600·11	154·2	10.526	
	Mapañ (village)	20·09	63	29·56	84	1,677·24	169·8	11,082	
	Panchoo (village)	19·95	63	29·56	84	1.707·61	173	11,284	
	Milum (village)	19·90	67	29·56	84	1.718·51	182·4	11.405	
	Milum Temple	19·71	67	29·56	84	1,760·17	186·8	11,682	
	Milum, bridge on Goree R.	19·96	69	29·56	84	1,705·43	185·1	11,343	
	Goree R: emerges from the Snow	19·77	63	29·56	84	1.746·97	176·9	11,543	
	Birjoo (village)	19·92	62	29·56	84	1.714·15	171·45	11,314	
40	Boorpho (village)	20·28	65	29·56	84	1,636·36	169·65	10.836	
	Boorpho Spar Bridge, on Goree R.	20·38	65	29·56	84	1,615·	167·5	10,695	
	Bridge on Sooring Ghar N.	25·55	68	29·56	84	633·13	67·97	4,207	
	Doomuñr (village) Moonsheeare P.	25·1	74	29·56	84	710·3	81·46	4,751	
	Rañtee (village)	24·31	72	29·56	84	849·19	95·31	5.667	
	Birneeagaon (village)	24·04	71	29·56	84	897·7	99·66	5,984	
	Bétoolee Ghat	21·57	63	29·56	84	1,368·54	138·6	9,043	
	Kalee Moondee Ghat	21·49	58½	29·56	84	1,384·68	132·6	9,104	
	Bridge on Jukoöla R.	25·14	66	29·56	84	703·39	73·8	4,663	
	Nakuree (village)	24·37	72	29·56	84	838·48	94·11	5,596	
50	Water-mills on Ghut-Ghar N.	24·49	76	29·56	84	817·15	95·7	5,477	

Approximate Altitudes of Places and Stations in Kumaon.

No.	Place of Observation.	Observation.		Comparison.		Approximate Altitude.	Equation for Temperature.	Absolute Altitude,	Remarks.
		Barometer.	Therm.	Barometer.	Therm.	Fathoms.	Fathoms.	in Feet.	
			°		°		+		
	Ranthee Temple	23·96	85	29·56	84	912·17	116·9	6,174	
	Bislekh Ghat	22·84	73	29·56	84	1,120·08	127·1	7,483	
	Hokura (village)	24·41	82	29·56	84	831·18	103·4	5,607	
	Hokura, bridge on Ramgunga R.	25·72	70	29·56	84	604·33	66·35	4,024	
	Ghoorureea Dhar	23·9	76	29·56	84	923·06	108·1	6,187	
	Lethee R. (ford)	24·72	76	29·56	84	776·56	90·96	5,205	
	Lethee (village)	24·20	77	29·56	84	868·89	102·8	5,830	
	Goatherd's hamlet on Lour Dhoora	21·04	69	29·56	84	1,476·58	160·4	9,822	
	Lour (village)	23·28	72	29·56	84	1,037·21	116·4	6,922	
60	Soopee (ford on Surjoo R.)	24·35	78½	29·56	84	842·05	101·2	5,659	
	Soopee (lower village)	23·91	73	29·56	84	921·24	104·5	6,154	
	Soopee (upper village)	23·47	74	29·63	84½	1,012·19	116·7	6,773	
	Byznath (station)	26·27	75	29·74	85	538·81	63·22	3,610	
	Chour (village)	23·60	71	29·74	85	1,004·29	112·7	6,702	
	Kumérée (village)	23·78	70	29·74	85	971·29	107·8	6,475	
	Kurim (village)	23·72	65	29·74	85	982·26	103·1	6,512	
	Bughur Temple	24·10	75	29·74	85	913·24	106·9	6,121	
	Gunna Nath (Hustee Dhul's stockade)	23·55	71	29·81	85	1,023·71	114·9	6,832	G. 6,900.
	Kalee Muth stockade (two days)	23·94	68	29·81	85	952·38	103·4	6,335	G. 6,489. See Nos. 85, 571.
70	Upper Tolee (village)	23·91	72	29·74	85	947·61	107·5	6,331	
	Rutmatha Hill	22·51	68	29·74	85	1,209·66	131·4	8,046	
	Jugthana (tent)	24·64	83	29·74	85	817·	103·7	5,524	Jugthana village 90 ft. below tent, = 5.434 ft.
	Bysanee (village)	25·72	87	29·74	85	630·7	83·1	4,283	
	Lumchoola Ghat	23·24	74	29·74	85	1,071·05	124·1	7,171	
	Lumchoola (village)	25·02	70	29·74	85	750·54	83·31	5,003	
	Ojoola (tent above the village)	25·68	86	29·74	85	637·46	83·22	4,324	

Approximate Altitudes of Places and Stations, in Kumaoñ.

No.	Place of Observation.	Observation. Barometer.	Observation. Therm.	Comparison. Barometer.	Comparison. Therm.	Approximate Altitude. Fathoms.	Equation for Temperature. Fathoms.	Absolute Altitude, in Feet.	Remarks.
			°		°		+		
	Runchoola (temple in fort)	25·82	68	29·74	85	615·85	66·66	4,083	G. 4,106.
	Jintolee Churhaee	24·67	79	29·74	85	811·72	99·03	5,464	
	Byznath Temple	26·33	75	29·74	85	528·9	61·94	3,545	G. 3,614. See No. 735.
80	Bhéta (village on bank of Mynol N.)	25·02	55	29·81	85	760·75	70·53	4,988	
	Boodhulee Churhaee	24·26	60	29·81	85	895·43	88·47	5,903	
	Bhyñsurgaon (Talookh Munsaree)	25·22	74	29·81	85	726·17	84·16	4,862	
	Reservoir near Gunna-Nath Temple	24·04	72	29·81	85	934·28	106·	6,242	
	40 feet above Busolee (village)	25·43	82	29·81	85	690·16	84·76	4,650	Busolee, 4,610 ft.
	Kalee Muth	23·89	67	29·81	85	961·46	103·2	6,388	G. 6,489. See Nos. 69, 571.
	Col. Lyons' house, Almora	24·64	65¼	29·81	85	827·21	86·99	5,485	
	Fort Moira	24·679	64	24·685	64	+1·06	·08	5,492	C. O. at Col. Lyons' house.
	Fort Almora	24·804	64·5	24·633	63	−30·05	2·33	5,291	Do. do. G. 5,409.
	St. Mark's Tower	24·673	67	24·534	71	−24·54	2·22	5,325	Do. do. G. 5,477.
90	Hawul Bagh (house)	26·04	69	29·81	85	587·21	64·47	3,910	G. 3,961. See No. 546.
	Mount Browne (Almora)	24·399	69	23·774	67	−112·7	9·9	5,626	C. O. at Kaleemuth. G. 5,777.
	Soopeh (village) Chanee	25·40	80	29·89	85½	695·28	86·1	4,688	
	Dhoul-Cheena (tent) or Sym Déo	24·16	73	29·89	85½	924·29	106·55	6,185	Crest of the ridge about 100 ft. higher.
	Khoonkhét (village)	26·66	73	29·89	85½	496·66	60·29	3,342	
	Kurulagaoñ (village) Roethaghar	26·19	76	29·89	85½	573·91	68·27	3,853	
	Khureh (station)	25.384	74½	29·89	85½	710·34	83·19	4,761	G. 4,833.
	Raekholee (tent)	24·62	73	29·89	85½	842·38	97·12	5,637	
	Thurnolee (tent)	25·186	69	29·89	85½	742·98	82·04	4,950	
	Jagésur Temple	24·375	70¾	29·89	85½	886·7	99·74	5,919	
100	Boodha Jagésur Temple	23·408	56	24·421	63	+183·45	12·31	+1,171	Correspondent observation at Jagésur Temple. Boodha Jagésur above Calcutta 7,090 ft.

Approximate Altitudes of Places and Stations in Kumaoñ.

No.	Place of Observation	Observation. Barometer.	Observation. Therm.	Comparison. Barometer.	Comparison. Therm.	Approximate Altitude. Fathoms.	Equation for Temperature. Fathoms.	Absolute Altitude, in Feet.	Remarks.
			°		°		+		
	Shem Deo Ridge	23·90	64	29·93	84	977·09	100·1	6,463	
	Koontola (village)	24·35	69	29·93	84	896·08	97·30	5,960	
	Biluk (station)	24·454	71	29·93	84	878·28	97·51	5,855	G. 5,720.
	Bhynsaree Temple	25·784	76	29·93	84	646·56	75·73	4,334	
	Dusoula-khét (on Shineea R.)	27·864	79	29·93	84	311·26	37·6	2,093	
	Dhuulékh Ridge	26·038	70	29·93	84	604·66	66·4	4,026	
	Baruhkot (station)	25·034	68½	29·93	84	776·46	83·84	5,162	G. 5,169.
	Raméshur Temple, confluence Surjoo and Ramgunga R.	28·431	78	29·93	84	223·3	26·7	1,500	
	Byra (upper fields of the village)	25·812	73	29·93	84	643·19	72·98	4,297	
110	Peepul tree in rice fields, on Kalsilla R.	27·234	71	29·93	84	410·59	45·59	2,737	
	Keemar (village)	25·253	67	29·93	84	738·46	78·38	4,901	
	Kandé Temple (Salim station)	24·721	63	29·93	84	830·59	84·11	5,488	G. 5,439.
	Bujkunda (shilung tree)	25·73	69	29·93	84	656·67	71·3	4,368	
	Thath (station)	24·224	66	29·93	84	919·33	96·45	6,095	Another observation gives 6,194 ft. Hence Calcutta observations corresponding are used. G. 6,089.
	Shem-Deo Temple	23,631	60	29·93	84	1,026·43	100·2	6,760?	G. 7,037.(?)
			Centigr.		Centigr.	Feet.	Feet.		
	Onéoona (village)	25·148	17·8	30·02	22·2	4,614	394	5,008	Hence computations made with new Tables.
	Choukhoonta Temple	23·773	18·9	30·06	21·7	6,115	530	6,645	
	Chooreeghar (village)	25·031	15·5	30·08	21·1	4,788	373	5,161	
	Sooee (village)	24·587	18·3	30·06	21·1	5,237	441	5,678	
120	Kurael (village)	25·972	22·8	30·08	21·1	3,826	357	4,183	
	Deogoor Ghat	23·732	15	30·06	21·1	6,160	473	6,633	

Approximate Altitudes of Places and Stations in Kumaoń.

No.	Place of Observation.	Observation.		Comparison.		Approximate Altitude. Fathoms.	Equation for Temperature. Feet.	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Therm.	Barometer.	Therm.				
			Centigr. c		Centigr. c				
	Soonkot, Lower (village)	25·478	17·8	30·04	21·7	4,292	362	4,654	
	Suleeanee (village)	25·884	20	30·07	21·7	3,906	347	4,253	
	Khuréh (village)	25·526	16·7	30·08	21·7	4,278	351	4,629	
	Baél	24·678	16·1	30·09	21.1	5,067	402	5,469	
	Kéla-Ghat (on Beesjoola N.)	27·952	20	30·13	20·6	1,955	168	2,123	
	Bhinjur (tent)	26·837	18·9	30·13	21·1	3,016	258	3,274	The village about 100 feet higher = 3,374 ft.
	Khutolee (village)	25·454	16·1	30·13	19·4	4,394	323	4,717	
	Tand (village)	26·056	15·5	30·13	19·4	3,785	280	4.065	
130	Loolan-Gurhee (Gorkha stockade)	24·859	11·7	30·13	18·3	5,011	321	5.332	
	Doorga Peepul (on Oghuleea N.)	27·984	16·7	30·13	18·3	1,925	143	2,068	
	Kul-luga (a cattle station at foot of hills)	29·214	23·9	20·13	19·4	804	73	877	In Turace.
	Napukmuth	29·398	18·9	30·06	20·5	581	49	630	See No. 595.
			Fahr.			Fathoms.	Fathoms.		
	Ford, Nyar R.	28·376	58	29·875	..	223·6	28·6	1,513	The temperature at the station of comparison, though used in the *calculation*, has been omitted by mistake.
	Birung (fields about 250 ft. below village)	26·780	82	29·875	..	475	59·8	3,209	
	Juwara (village)	25·850	83	29·832	..	396·6	51·3	2,687	
	Mulooakhal	24·816	66	25·852	..	177·6	17·1	1,168	Corresponding Observation at Juwara. Height of Mulooakhal above Calcutta = 3,856 ft.
	Koonjeth (tent)	25·782	80	29·832	..	408·1	50·8	2,753	The village about 90 ft. higher = 2,843 ft.

ALTITUDES of PLACES and STATIONS in KUMAOÑ deduced from Barometrical Observations, made during a Survey of that Province, by Capt. W. S. WEBB.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
139	Kasheepoor Factory, Bungalow......	..	..	..	..	..	..	..	..	..	..	See also No. 529.
	Mean of 4 days in February, 1818....	29·280	16·1	16·1	30·097	21·1	21·1	·029	691	55·8	746·8	
	Do. 4 do. do.	29·229	16·1	16·1	30·033	21·1	21·1	·029	681·5	53·94	735·44	
	Do. 4 do. do.	29·222	20·6	20·6	30·005	22·2	22·2	·009	681·5	62·06	743·56	
	Do. 5 do. do.	29·056	20·	20·	29·914	24·5	24·5	·026	699	66·6	765·6	See this computation at length.
	Mean of the above observations in 1818	..	..	..	..	..	..	..	..	..	747·8	
	Mean of 3 days' observation in January, 1819....................	29·129	16·7	16·7	29·975	22·8	22·8	·045	704·5	59·1	763·6	
	Do. 5 do. in February, 1819...	29·145	20·	20·	29·998	22·8	22·8	·016	737	66·34	803·34	
145	Do. 5 do. do. ...	29·131	21·7	21·7	29·908	26·1	26·1	·026	663	66·92	729·92	
	Mean of the above observations in 1819	..	..	..	..	..	..	..	..	..	765·6	
	Mean result of both years...........	..	..	..	..	..	.	..	..	..	756·7	

The elevation of the factory Bungalow, at Kasheepoor, is thus computed to be 757 feet above Mr. Colvin's house, at Calcutta, where the corresponding observations were made: the station, whence altitudes of some of the snowy peaks were observed, is about 35 feet lower, or 722 feet.

A list of altitudes of many places in this survey has been published in the Asiatic Researches, in which the height of the station, at Kasheepoor, was assumed (from a general estimate of the declination of level to the sea) to be 659 feet; and upon that estimate, Kasheepoor being taken as the zero of my observations, all the *geometrical* altitudes in the survey are based. The barometrical result exceeds this estimate by 72 feet, which quantity must therefore be added to all the elevations given in the above-named list, which are geometrically deduced.

No allowance has been made for the height of Mr. Colvin's house above the sea, which is probably from 70 to 100 feet.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Koolsaree rope bridge, on Pindur R. . .	26·54	31·7	31·7	30·04	31·1	31·1	..	3,227	433	3,733	(*a.*)
	Sirgoor Temple....................	25·832	26·7	26·7	30·01	31·7	31·7	·016	3,891	488	4,467	(*a.*)
	Bugolee-Seera rope bridge	27·234	28·9	28·9	29·98	32·2	32·2	·018	2,485	323	2,864	(*a.*)
	Old Temple at Kurn Prag, 50 ft. above junction of Pindur and Ganges Rivers........................	27·584	30·6	30·6	30·0	32·2	32·2	·009	2,180	292	2,521	(*a.*) See Nos. 165 and 642.
150	Nugrasoo Temple	27·366	28·3	28·3	30·03	32·2	32·2	·021	2,401	308	2,763	(*a.*)
	Burosee-Chara	24·968	23·9	23·9	29·99	29·4	29·4	·027	4,747	540	5,287	This and following observations from Mr. Tate's Field Book.
	Bishun Prag (Peepul Tree)..........	25·422	17·5	16·7	24·968	23·9	23·9	·031	−501	43	4,743	C. O. at Burosee Chara, (See No. 286.)
	Confluence of Khiroh R..............	22·550	17·8	17·2	29·98	29·4	29·4	·048	7,365	732	8,097	
	Gundolee (village)..................	20·378	13·3	13·3	29·96	28·9	28·9	·064	9,962	899	10,861	
	Mana Bridge	20·640	7·8	7·8	20·350	6·1	5	·007	−359	10	10,492	C. O. at Gundolee.
	Moosapanee (halting ground).........	19·475	3·9	3·3	20·375	5	4·4	·004	+1,172	+19	12,052	C. O. at Gundolee.
	Ghastolee do.	18·560	−2·8	−2·8	19·475	0	0	·010	+1,241	−7	13,286	C. O. at Moosapanee.
	Dhun-Rao do.	17·37	−9·4	−9·4	18·56	−2·8	−2·8	·023	+1,693	−44	14,935	C. O. at Ghastolee.
	Ratha-Köond do.	16·572	−10	−10	17·37	−9·4	−9·4	·002	+1,222	−50	16,107	C. O. at Dhun-Rao.
160	Do. compared with Calcutta (noon)	16·64	1·7	1·7	30·034	28·9	28·9	·090	15,246	+996	16,242	
	Jograo (halting ground)	15·855	−13·9	−13·9	16·572	−10	−10	·012	+1,133	−58	17,182	Supposed to be at least 1,000 ft. below summit of the pass. Barometer injured. C. O. at Ratha-Köond.
	Bhudree Nath Temple	20·70	9·4	7·2	29·99	28·9	28·9	·080	9,560	734	10,294	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Pundkésur Temple	24·02	15·	15·	30·03	29·4	29·4	·069	5,744	544	6,288	
	Nund Prag	27·12	18·9	18·9	29·96	23·9	23·9	·027	2,569	233	2,802	See No. 634.
	Kurn Prag (temple in village)	27·376	26·1	25·6	29·94	29·4	29·4	·018	2,315	272	2,587	See Nos. 149 and 642.
	Nynee Tal	23·915	7·2	7·2	29·97	26·7	26·7	·094	5,779	417	6,196	
	Bheem Tal	25·735	24·4	24·4	29·945	29·4	29·4	·025	3,923	449	4,372	G. 4,343.
	Hunooman-Köond	25·93	23·3	23·3	29·98	30·	30·	·035	3,696	420	4,116	
	Luchmun-Köond	25·932	23·9	23·9	29·98	30·	30·	·032	3,747	430	4,177	
170	Nokoocheea Tal	25·78	26·7	26·7	29·87	30·	30·	·017	3,820	461	4,281	
	Mulooa Tal	26·435	29·4	29·4	29·95	32·8	32·8	·018	3,235	429	3,664	
	Ulmakhan (ridge of Ghagur above Nynee Tal)	23·2	20·	20·	29·96	31·1	31·1	·05	6,607	719	7,326	
	Kath-Godam	28·08	35·	35·	29·82	30·6	30·6	·026	1,589	220	1,809	
	Seeahee Temple	23·20	23·3	23·3	29·86	31·1	31·1	·036	6,536	762	7,298	Mr. Tate's observations end. G. 7,265.
	Skérkot	29·29	17·2	17·2	30·02	25·	25·	·046	601	53	654	
	Nujeebabad	29·129	18·3	18·3	30·03	23·3	23·3	·029	768	67	835	See Nos. 356 and 374.
	Jafurabad	28·97	25·	25·	30·03	23·3	23·3	·010	945	96	1,041	See No. 375.
	Kotdwara (Ford Koh R.)	28·607	23·3	23·3	29·98	23·3	23·3	..	1,221	121	1,342	See No. 376.
	Kotdwara (Tuhseeldar's House)	28·413	24·4	24·4	28·569	25·	25·	·003	+140	15	1,497	C. O. at the Ford.
180	Dhoora kee Tal	25·873	21·7	21·7	29·98	23·3	23·3	·008	3,831	369	4,200	
	Churékh Ridge	25,021	22·2	22·2	29·93	24·4	24·4	·011	4,657	464	5,121	
	Lungoor Fort	23·904	18·9	18·9	29·947	27·2	27·2	·040	5,829	573	6,402	
	Do. do.	23·941	18·9	18·9	29·922	27·2	27·2	·040	5,767	566	6,333	
	Balee (village)	26·652	26·1	26·1	23·936	17·8	17·8	·040	−2,756	258·4	3,353	C. O. at Lungoor Fort.
	Darmakhet	25·322	21·1	21·1	30·035	27·8	27·8	·034	4,412·5	461·2	4,874	
	Gurhseer Peepul Tree (40 ft. below tent)	26·302	21·7	21·7	30·03	27·8	27·8	·032	3,422	361	3,783	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Dhoora (station) near Ajmeer Temple.	25·137	15·	15·	29·966	27·8	27·8	·064	4,513	411	4,924	
	Ajmeer Temple (Muhabulee T.)......	24·364	8·9	8·9	25·039	12·8	12·8	·019	+691	32	5,647	C. O. at Dhoora.
	Do. do.	24·454	15·	15·	25·104	15·	15·	..	+684	43	5,651	Do. do.
190	Observatory (tent)	25·108	15·	15·	25·052	15·	15·	..	−58	3	4,863	Do. do.
	Goaree (village)................	27·050	23·9	23·9	30·01	28·9	28·9	·027	2,681	301	2,982	
	Tent near Runchoola (station)	25·542	21·1	21·1	30·032	28·9	28·9	·040	4,180	447	4,627	
	Do. do.	25·519	21·1	21·1	29·964	28·9	28·9	·040	4,144	447	4,591	
	Runchoola (station).....	25·304	16·7	16·7	25·395	12·8	12·8	·020	+114	7	4,731	C. O. at Tent.
	Phuldakot (tent)	25·732	21·1	21·1	25·365	12·2	12·2	·045	−329	22	4,259	C. O. at Runchoola Tent.
	Phuldakot Peak	25·619	16·7	16·7	25·712	18·3	18·3	·008	+86	5	4,350	C. O. at Tent.
	Koolbunda-Seera (on Héonla R.)	27·045	29·4	29·4	29·88	28·3	28·3	·007	2,603	320	2,923	
	Oonchakot (tent)................	25·653	22·8	22·8	29·88	28·9	28·9	·031	3,943	433	4,376	
	Phañsa-Khal (tent)	24·618	22·2	22·2	29·87	28·3	28·3	·030	5,007	539	5,546	
200	Do. do. Peak	24·472	15·	15·	24·390	20·	20·	·024	+99	7	5,652	C. O. at Tent.
	Bureth (80 ft. below village)..........	25·437	19·4	19·4	29·88	28·9	28·9	·048	4,145	427	4,572	
	Nogurh Peak	24·113	18·9	18·9	29·88	28·9	28·9	·048	5,536	578	6,114	
	Huthnoura Temple	27·079	27·8	27·8	29·875	29·4	29·4	·009	2,551	312	2,863	
	Kunoulee (tent)..................	23·385	18·9	18·9	29·825	31·1	31·1	·057	6,274	670	6,944	
	Oolka (tent)	23·57	21·7	21·7	29·872	31·7	31·7	·047	6,123	697	6,820	
	Do. do.	23·563	20·6	20·6	29·897	31·1	31·1	·049	6,150	677	6,827	
	Do. do.	23·544	20·	20·	29·895	30·	30·	·047	6,171	660	6,831	
	Do. do.	23·495	16·7	16·7	29·845	31·1	31·1	·068	6,158	629	6,787	
	Mean of the above	..	..	..	..	..	..	..	..	.	6,816	See No. 320.
	Oolka (tree in the upper fort)........	23·421	15·6	15·6	23·506	15·6	15·6	..	+95	6	6,918	C. O. at Tent.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
210	Soomaree Temple	25·133	22·8	22·8	29·772	31·1	31·1	·041	4,372	503	4,875	See No. 469.
	Soomaree Station (tree)	25·259	17·8	17·8	25·071	17·8	17·8	..	—195	14	4,666	C. O. at Temple.
	Sireenugur (Bungalow)	27·907	30·6	30·6	29·69	31·1	31·1	·003	1,611	211	1,822	See Nos. 321, 482, 483.
	Sindooree (village)	26·778	32·8	32·8	29·689	31·7	31·7	·006	2,694	371	3,065	
	Dharkot (120 ft. above village)	25·423	31·1	31·1	29·689	31·7	31·7	·003	4,039	543	4,582	
	Soura (80 ft. below village)	24·503	27·8	27·8	29·678	32·2	32·2	·022	4,969	636	5,605	
	Sukneana (about 120 ft. above village)	24·277	27·8	27·8	29·678	32·2	32·2	·022	5,210	667	5,877	
	Pokree-Khal	25·695	31·1	31·1	29·688	32·2	32·2	·006	3,758	506	4,264	
	Sooreh-Khal	25·722	31·1	31·6	29·688	32·2	32·2	·006	3,730	506	4,236	
	Agustmoondee (tent) near Temple	27·041	35·6	35·6	29·688	32·2	32·2	·020	2,450	356	2,806	See No. 612.
220	Chundrapoor Temple	27·023	35·	35·	29·688	32·2	32·2	·016	2,464	353	2,817	
	Temreea (village)	26·384	28·3	28·3	29·687	32·2	32·2	·021	3,052	393	3,445	
	Naluhputun (about 70 ft. above temple)	25·164	29·4	29·4	29·687	32·2	32·2	·014	4,292	567	4,859	
	Mykhinda (village)	24·538	25·	25·	29·706	32·2	32·2	·035	4,942	603	5,545	See No. 233.
	Ukrotkotee (do.)	24·121	26·7	26·7	29·706	32·2	32·2	·026	5,397	679	6,076	See No. 232.
	Gouree Koond (tent)	23·412	22·8	22·8	29·79	31·7	31·7	·042	6,232	726	6,958	See No. 230.
	Gouree Koond (hot well)	23·620	17·8	17·8	23·337	18·3	18·3	·002	—316	23	6,619	C. O. at Tent.
	Bheem Odeear	21·881	17·8	17·8	29·75	31·7	31·7	·061	7,933	837	8,770	See No. 229.
	Kedar Nath (porch of temple)	19·642	12·8	12·8	29·76	32·2	32·2	·076	10,725	1,030·5	11,755·5	
	Bheem Odeear	21·884	20·	20·	29·73	31·7	31·7	·051	7,923	872	8,795	See No. 277.
230	Gouree Koond (tent)	23·375	25·5	25·5	29·72	31·7	31·7	·029	6,225	761	6,986	See No. 225.
	Jhilmilputun Bridge	24·355	16·7	16.7	29·69	31·7	31·7	·073	5,083	525	5,608	
	Ukrotkotee (village)	24·063	28·9	28·9	29·69	31·7	31·7	·013	5,461	706	6,167	See No. 224.
	Mykhinda ,,	24·593	15·5	15·5	29·67	31·1	31·1	·076	4,810	478	5,288	See No. 223.
	Naluhputun	25·184	27·2	27·2	29·65	30·5	30·5	·016	4,238	530	4,768	See No. 617.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers Attached. Centigrade.	Comparison. Thermometers Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Oolkee Muth Temple, or Ookee Muth	25·543	20·5	20·5	29·74	31·1	31·1	·054	3,909	431	4,340	See No. 619.
	Oolkee Rope Bridge	26·333	17·2	17·2	25·543	20·6	20·6	·018	−811	64	3,465	C. O. at Temple.
	Dhurmsalu on Khakra R.	24·189	17·8	17·8	25·521	18·3	18·3	·002	+1,394	108	5,842	Do. do.
	Toong Nath (Dhurmsala)	21·538	17·2	17·2	25·634	21·1	21·1	·017	+4,516	369	9,224	Do. do.
	Crest of Toong Nath Ridge	21·254	20·5	20·5	25·634	21·1	21·1	·002	+4,879	435	9,654	Do. do.
240	Head of Nighol Gunga.............	21·416	17·8	17·8	25·521	18·3	18·3	·002	+4,566	351	9,257	Do. do.
	Mundul...........................	25·108	25·6	25·6	29·756	32·2	32·2	·033	4,390	449	4,839	
	Gopésur Temple....................	25·22	22·2	21·1	29·722	32·2	32·2	·050	4,228	479	4,707	See Nos. 293 and 637.
	Peepulkotee Bridge	36·311	24·4	23·3	29·692	31·7	31·7	·039	3,112	366	3,478	See No. 292.
	,, Peepul Tree............	25·450	31·7	31·7	29·692	31·7	31·7	..	4,017	545	4,562	See Nos. 290 and 638.
	Bridge on Putal-Gunga R.	24·285	31·7	28·9	29·686	31·7	31·7	..	4,181	542	4,723	
	Road crosses Pugnaon R.	23·704	21·7	21·1	29·686	31·7	31·7	·048	5,811	656	6,467	See No. 287.
	Josee Muth (tent)	23·928	27·8	27·8	29·648	30·6	30·6	·013	5,604	698	6,302	See No. 284.
	Goatherd's Hamlet (tent)	21·782	21·1	21·1	29·60	28·9	28·9	·034	7,951	849	8,800	
	Ascent of Pilgoenta Hill (second tent)	19·689	13·3	13·3	29·622	28·3	28·3	·058	10,566	938	11,504	
250	Crest of Pilgoenta Ridge	18·910	12·2	12·2	25·63	28·3	28·3	·061	11,618	1,002	12,620	
	Panagaon (five days)	22·007	18·3	18·3	29·632	30·	30·	·051	7,691	793	8,484	
	Do. (five days)	21·985	18·3	18·3	29·572	29·6	29·6	·050	7,666	782	8,448	
	Do. (six days)	21·957	20·6	20·6	29·537	27·8	27·8	·032	7,689	794	8,483	
	Mean altitude........	..	..	..	..	..	..	..	..	..	8,471	
	Tupoobun	24·001	25·6	25·6	29 70	29·4	29·4	·018	5,532	650	6,182	
	Samungentha.......................	23·012	23·3	23·3	29·70	29·4	29·4	·028	6,617	744	7,363	See No. 275.
	Mularee	20·693	20·	20·	29·63	28·9	28·9	·036	9,309	969	10,278	See No. 271.
	Phurkeea	20·348	17·2	17·2	29·63	29·4	29·4	·050	9,728	968	10,696	See No. 270.

Altitudes of Places and Stations in Kumaon, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Jelum	21·402	16·7	16·1	29·64	28·9	28·9	·052	8,422	810	9,232	See No. 273.
	Neetee Village (five days)	19·828	20·	20·	29·557	29·4	29·4	·038	10.352	1,094	11,446	
260	Khurgaon (halting ground)	19·425	22·2	22·2	19·832	22·8	22·8	·002	+537	52	12,035	C. O. at Neetee.
	Gothing Pasture (30 ft. above Dhoulee R.)	18·882	23·3	23·3	29·56	29·4	29·4	·023	11,647	1,307	12,954	
	Gildoong (halting ground) three days	17·407	12·8	12·8	29·52	29·4	29·4	·057	13,679	1,240	14,919	
	Keoonlung (,, ,,) two days	17·542	11·7	11·7	29·485	26·1	26·1	·050	13,456	1,087	14,543	
	Neetee Pass (the pile of stones)	16·270	8·3	8·3	17·542	12·2	12·2	·013	+1,941	85	16,569	C. O. at Keoonlung.
	The same with Calcutta (Col. Hardwicke)	16·270	8·3	8·3	29·51	28·5	28·5	·065	15,411	1,213	16,624	By Mr. Colvin—Barometer 29,402 ins., Thermometer 28″. 9, Altitude 16,625 ft.
	Neetee Pass (extremity of tongue projecting northward)	16·328	12·8	12·8	16·270	8.3	8·3	·015	—69	3	16,497	C. O. at Pile of Stones.
	Confluence Khurbuseea and Dhoulee Rivers	18·341	17·8	17·8	29·562	28·9	28·9	·041	12,380	1,233	13·613	
	Neetee Village (six days)	19·841	18·9	18·9	29·658	29·4	29·4	·042	10,420	1,072	11·492	
	Do. do. (six days)	19·855	16·7	16·7	29·728	28·9	28·9	·049	10,454	1,019	11·473	Mean Altitude of Neetee 11,464 ft. See No. 259.
270	Phurkeea	20·458	18·9	18·9	29·718	28·3	28·3	·039	9,678	977	10,655	See No. 257. The Bridge on Doompoo R. is 338 ft. below this village 10,317 ft.
	Mularee	20·812	20·6	20·6	29·716	28·3	28·3	·032	9,240	964	10,204	See No. 256.
	Spar Bridge on Doulee R.	21 274	16·7	16·7	20·812	20·6	20·6	·017	—593	46	9,564	C. O. at Mularee. This Bridge is near Phurkeea.
	Jelum	21·425	24·4	24·4	29·718	28·3	28·3	·017	8.505	955	9,460	See No. 258.

Altitudes of Places and Stations in Kumaon, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Spar Bridge on Dhoulee R. (3 spars)	21·534	21·7	21·7	21·425	24·4	24·4	·012	−147	14	9·299	C. O. at Jelum. This bridge is between Mularee and Jelum.
	Sumungentha	23·058	22·8	22·8	29·712	28·3	28·3	·025	6,578	717	7·295	See No. 256.
	Spar Bridge on Dhoulee R.	22·724	15·6	15·6	23·058	22·8	22·8	·033	+332	27	7,654	C. O. at Sumungentha. This bridge is near Jelum.
	Do. do. on Reendee R.	23·696	16·7	16·7	29·706	28·3	28·3	·055	5,829	560	6,389	
	Do. do. on Ringee R.	23 956	20·	20·	23·696	16·7	16·7	·016	−268	20	6,101	C. O. at Reendee Bridge.
	Tooghasee Village (two days)	22·307	16·7	16·7	29·68	27·8	27·8	·050	7,382	699	8,081	
280	Do. do. (six days)	22·424	15·6	15·6	29·842	28·9	28·9	·060	7,377	699	8,076	
	Do. do. (six days)	22·431	18·3	18·3	29·805	28·9	28·9	·048	7,351	741	8,092	
	Mean of the above	..	..	..	..	..	..	..	..	..	8,083	
	Mergh (Punchukee)	22·858	19·4	19·4	29·766	29·4	29·4	·046	6,828	710	7,538	
	Josee Muth (tent)	23·991	23·9	23·9	29·77	27·2	27·2	·016	5,606	612	6,218	See No. 247.
	Josee Muth (station)	22·031	19·4	19·4	29·807	29·4	29·4	·044	7,825	815	8,640	
	Josee Muth Nur-Sing Temple	24·072	17·8	17·8	24·026	19·4	19·4	·008	−59	4	6,155	C. O. at Tent.
	Bishun Prag (Spar bridge)	25·239	22·8	21·7	23·958	23·9	23·9	·005	−1,362	126	4,730	Do. do. See No. 152.
	Road crosses Pugnaon R.	23·811	24·4	24·4	29·80	28·3	28·3	·019	5,826	655	6,481	See No. 246.
	Punkhee Muth Temple	25·343	27·8	27·8	29·80	28·3	28·3	·003	4,219	504	4,723	
	Bridge on Pural Gunga R.	25·464	15·6	15·6	25·343	27·8	27·8	·062	−187	17	4,519	C. O. at Punkhee Muth.
290	Peepulkotee (fields of)	25·639	22·8	22·8	29·81	30·	30·	·037	3,890	438	4,328	See Nos. 244 and 638.
	Doongree (80 ft. below village)	24·928	25·6	25·6	29·87	29·4	29·4	·019	4,693	553	5,246	See No. 639.
	Peepulkotee Bridge	26·424	14·4	14·4	24·928	25·6	25·6	·059	−1,577	134	3,535	C. O. at Doongree Tent. See No. 243.

Altitudes of Places and Stations in Kumaon, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer	Thermometers. Attached.	Thermometers. Detached.	Barometer.	Thermometers. Attached	Thermometers. Detached.					
			Centi grade.			Centi grade.						
			°	°		°	°					
	Gopeşur Temple (about 100 ft. above temple)	25·203	25·6	25·6	29·87	29·4	29·4	·019	4,408	517	4,925	See Nos. 242 and 637.
	Bridge and Punchukee on Bal-Gunga R.	25·460	19·4	18·3	29·87	29·4	29·4	·051	4,111	419	4,530	
	Kandé (30 ft. below village)	24·512	24·4	24·4	29·87	29·4	29·4	·024	5,126	589	5,715	
	Bunghéla (tent)	21·855	18·9	18·9	29·87	29·4	29·4	·046	8,087	831	8,918	
	Bunghéla (station)	21·736	8·9	8·9	21·830	11·1	11·1	·010	+99	4	9,021	C. O. at Tent.
	Jourasee	25·115	23·3	23·3	29·87	29·4	29·4	·030	4,487	502	4,989	
	Déothula Temple (two days)	24·017	23·3	23·3	29·87	29·4	29·4	·029	5,652	636	6,288	
300	Choundee (about 100 ft. above village)	25·224	22·2	22·2	29·87	29·4	29·4	·036	4,369	480	4,849	
	Muhur Temple (25 ft. below temple)	25·015	22·8	22·8	29·87	29·4	29·4	·033	4,588	512	5,100	
	Agur Camp (three days)	23·176	17·2	17·2	29·92	29·4	29·4	·056	6,593	657	7,250	
	Agur Peak	22·599	12·8	12·8	23·103	9·4	9·4	·016	+603	28	7,881	C. O. at Camp. See No. 628.
	Hisala	25·832	25·6	25·6	29·93	29·4	29·4	·020	3,817	448	4,265	
	Bumot (20 ft. below village)	27·228	23·9	23·9	29·95	29·4	29·4	·030	2,454	279	2,733	
	Do. rope bridge on Aluknunda R.	27·592	11·7	11·7	27·225	23·9	23·9	·067	−409	30	2,294	C. O. at Bumot Tent.
	Kandé (about 160 ft. above village)	25·144	23·3	23·3	27·184	27·8	27·8	·022	+2,010	217	4,960	Do. do.
	Tolecar (25 ft. below village)	24·986	22·8	22·8	30·025	30·	30·	·036	4,749	536	5,285	
	Hureealee (tent)	23·019	12·2	12·2	24·986	22·8	22·8	·049	+2,082	156	7,523	C. O. at Tolecar.
310	Hureealee Temple	21·346	8·3	8·3	22·998	7·2	7·2	·005	+1,947	64	9,534	C. O. at Tent.
	Gopheer (about 60 ft. below village)	24·542	18·9	18·9	29·978	28·3	28·3	·046	5,164	519	5,683	
	Goar (about 80 ft. above village)	24·369	16·1	16·1	29·977	27·8	27·8	·057	5,335	499	5,834	
	Doongra (village)	24·950	16·7	16·7	29·95	27·8	27·8	·055	4,702	446	5,148	
	Burjakhunee Ghat	23·499	10·6	8·9	24·976	18·3	18·3	·036	+1,548	90	6,786	C. O. at Doongra.
	Ford on Buchun Gudh R.	26·312	15·	13·9	24·976	18·3	18·3	·017	−1,375	95	3,678	Do. do.
	Pithondee-Khal	23·155	16·7	13·3	29·94	28·3	28·3	·053	6,636	591	7,227	
	Chopura Tent (two days)	23·567	17·8	17·8	29·94	27	27·2	·044	6,188	594	6,782	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + det Barom	Approximate Altitude, in Feet.	Equation for Temperature, in Feet. +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Chopura Station (Bunraree Temple) ..	23·403	12·2	11·7	23·55	11·1	11·1	·005	+169	18	6,959	C. O. at Tent.
	Khursoo-Syna (Déota's Thau)	24·420	18·3	18·3	30·	27·2	27·2	·044	5.316	515	5.831	
320	Oolka Camp (same ground)	23·613	15·6	15·6	30·05	27·2	27·2	·055	6.221	569	6.790	See Nos. 205–208.
	Sireenugur Bungalo............	28·279	19·4	19·4	30·032	26·7	26·7	·042	1.621	159	1,780	See Nos. 212, 482, 483.
	Paoree (village)	24·942	18·3	18·3	28·251	20·	20·	·005	+3,238	264	5,281	C. O. at Sireenugur. See Nos. 400, 472–481, inclusive; also No. 522.
	Nishunee (about 60 ft. below village) .	25·344	17·2	17·2	30·03	26·1	26·1	·045	4,375	404	4,779	
	Booba-Khal.........................	24·392	11·7	10·6	25·344	17·2	17·2	·027	+969	57	5,805	C. O. at Nishunee Tent.
	Chopureeoñ (50 ft. below village).....	25·[illegible]72	21·7	21·7	30·	25·	25·	·017	3.841	382	4,223	
	Bhynsoora-Khal.....................	23·834	11·1	10·6	25·853	21·1	21·1	·048	+2.067	139	6.429	C. O. at Chopureeoñ Tent.
	Bidolee (80 ft below village)	26·164	19·4	19·4	30·	25·	25·	·029	3.536	335	3,871	
	Chipul-Ghat (Peepul Tree)...........	26·438	20·6	20·6	30·	25·	25·	·023	3.271	319	3,590	
	Synjee (Dak Hut)..................	25·090	19·4	19·4	30·005	24·4	24·4	·025	4.635	434	5,069	
330	Kufurolee (lower houses)	23·544	21·1	21·1	30·01	24·4	24·4	·014	6.308	611	6,919	
	Punjik-Khal	22·558	9·4	8·9	23·544	21·1	21·1	·053	+1,054	675	8.040	C. O. at Kufurolee.
	Kuneoor (about 150 ft. below village)..	24·245	19·4	19·4	30·02	23·9	23·9	·022	5.543	512	6,055	See No. 649.
	Ford on Sanee R....................	24·732	1·1	0·	24·25	6·7	6·7	·028	–542	8	5,505	C. O. at Kuneeoor Tent.
	Masoñ (about 120 ft. below village) ...	24·65	20·	20·	30·03	23·9	23·9	·019	5,124	480	5,604	
	Khundeea-Khal	22·824	13·9	12·8	24·65	20·	20·	·028	+1,974	138	7,715	C. O. at Mason Tent.
	Chouthan (Dak Hut)................	25·512	20·6	20·6	30·026	23·9	23·9	·017	4.228	400	4,628	
	Octurala (Dak Hut on Chouthan R.) .	26·634	19·4	19·4	30·022	23·9	23·9	·024	3,097	285	3,382	
	Tamadhond (Dak Hut)...............	27·130	20·	20·	30·028	24·4	24·4	·024	2,621	249	2,870	
	Boodha-Kedar Temple...............	27·323	20·6	20·6	30·025	24·4	24·4	·021	2,437	234	2,671	
340	Kuman (village)...................	26·439	16·7	16·7	29·99	25·	25·	·044	3,240	287	3,527	
	Nagnee (village)	25·019	20·	20·	30·	25·6	25·6	·028	4,702	458	5,160	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Jaeraj-Khal	23·935	14·4	12·2	25·019	20·	20·	·026	+1,126	77	6,364	C. O. at Nagnee.
	Tulaen (village)	26·024	20·6	20·6	30·006	25·	25·	·023	3,687	358	4,045	
	Punas (lower village)	25·832	13·9	13·9	30·035	23·9	23·9	·052	3,875	314	4,189	
	Kanda (village)	25·52	17·2	17·2	25·832	13·9	13·9	·017	+334	22	4,545	C. O. at Punas.
	Kundoolee-Khal	24·362	13·9	13·9	30·036	23·9	23·9	·049	5,402	437	5,839	
	Kola (village)	26·060	22·2	22·2	24·362	13·9	13·9	·041	−1,712	131	3,995	C. O. at Kundoolee-Khal.
	Jula kee Syna (35 ft. above Sanee R.)	27·119	15·6	14·4	26·060	22·2	22·2	·036	−1,072·5	84	2,838	C. O. at Kola.
	Tolee (40 ft. above village)	25·557	11·7	11·7	27·119	15·6	14·4	·020	+1,526	84	4,449	C. O. at Jula kee Syna."
350	Choumasoo (lower village)	27·825	18·3	18·3	30·06	22·2	22·2	·022	1,993	172	2,165	
	Choumasoo (ford, Sanee R.)	28·128	7·8	6·7	27·80	18·3	18·3	·059	−360	19	1,786	C. O. at Lower Choumasoo.
	Deodalee (village)	26·036	15·	15·	27·78	16·7	16·7	·009	+1,680	112	3,957	Do. do. do.
	Gooma-Khal	25·145	3·9	3·9	26·036	15·	15·	·055	+851	35	4,843	C. O. at Deodalee.
	Merooa (village)	26·658	18·9	18·9	26·036	15·	15·	·020	−595	42	3,320	Do. do.
	Koh R. (halting ground in wood)	27·703	18·9	18·9	30·075	21·7	21·7	·016	2,125	183	2,308	
	Nujeebabad (grove and tomb)	29·161	18·9	18·9	30·05	21·7	21·7	·016	768	65	834	See Nos. 176—374.
	Nugeena (Mr. Chalmer's house)	29·206	20·6	20·6	30·098	21·7	21·7	·006	779	70	849	
	Dhampoor	29·348	22·8	22·8	30·13	22·2	22·2	·004	689	65	754	
	Seohara, or Soohara	29·404	20·	20·	30·154	22·2	22·2	·013	645	57	702	
360	Gurhee	29·440	23·3	23·3	30·158	22·2	22·2	·007	633·5	61·3	695	
	Sunduleepoor-Manpoor	29·408	19·4	19·4	30·15	22·2	22·2	·017	634·5	56·2	691	
	Moradabad	29·404	22·2	22·2	30·108	22·2	22·2	..	616	58	674	
	Peepulsanda	29·330	23·9	23·9	30·074	22·2	22·2	·010	618	60	678	
	Kuchnar	29·265	20·	20·	30·052	22·2	22·2	·013	680	61	741	
	Belawala	29·240	21·1	21·1	30·022	22·2	22·2	·006	683	63	746	
	Kaseepoor-Sooar	29·206	19·4	19·4	29·972	21·7	21·7	·013	664	57	721	See No. 373.
	Khuleelpoor	29·4	22·2	22·2	30·042	21·1	21·1	·007	569	52	624	

Altitudes of Places and Stations in Kumaoṅ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Futtehgunj	29·428	23·3	23·3	30·042	21·1	21·1	·013	549·5	51	600·5	
	Hōōrhōōree	29·466	22·2	22·2	30·042	21·1	21·1	·007	511	47·5	558·5	
370	Dhunalee (second)	29·418	22·8	22·8	30·07	22·2	22·2	·004	575	56	631	
	Kumora-Dhumora	29·464	26·1	26·1	30·066	22·8	22·8	·022	546	56	602	
	Burhépoor	29·372	21·7	21·7	30·066	22·8	22·8	·006	603	55·5	658·5	
	Kaseepoor-Sooar	29·266	24·4	24·4	30·066	22·8	22·8	·010	711	71	782	See No. 366. Mean altitude 752 ft.
	Nujeebabad (grove)	29·059	28·9	28·9	29·913	27·8	27·8	·007	761	90·5	851·5	See Nos. 176, 356. Mean altitude 836 ft.
	Jafurabad	28·814	28·9	28·9	29·90	28·3	28·3	·004	968	117	1,085	See No. 177. Mean altitude 1,063 ft.
	Kotdwara (ford)	28·607	29·4	29·4	29·88	28·3	28·3	·007	1,131	141	1,272	See No. 178. Mean altitude 1,307 ft.
	Jooee (hamlet)	27,564	23·3	21·1	28·607	29·4	29·4	·034	+936	101	2,344	C. O. at Kotdwara Ford.
	Phoolinda (village)	26,230	25·6	23·3	27·561	23·3	21·1	·013	+1,305	122	3,771	C. O. at Jooee.
	Chunda (tent)	25,468	23·9	23·9	29·897	28·3	28·3	·022	+1,155	465	4,620	
380	Chunda-Khal	25,009	16·7	15·	25·468	23·9	23·9	·036	+436	35	5,090	C. O. at Chunda Tent.
	Danda Mundee (Kheema Nund's house)	27·089	20·3	20·3	29·93	28·9	28·9	·046	2,555	268	2,823	See No. 680.
	Chumeea-Khal	25·670	13·3	12·2	27·095	20·	20·	·034	+1,377	95	4,295	C. O. at Danda Mundee.
	Déosa. 30 ft. above village	25·575	23·3	23·3	29·93	28·3	28·3	·026	4,071	449	4,520	
	Tent in the wood	25·894	25·6	25·6	29·916	28·9	28·9	·017	3,745	435	4,180	
	Dooaree-Khal	24·764	12·8	12·2	25·894	25·6	25·6	·064	+1,095	89	5,364	C. O. at tent.
	Bilkhet Ford, Nyar R.	28·164	23·9	22·8	25·814	25·6	25·6	·010	−2,280	235	1,165	C. O. at do.
	Do. Mango tree	28·051	23·3	23·3	29·912	28·9	28·9	·031	1,646	183	1,829	
	Do. village	27·880	26·1	25·6	27·956	28·3	28·3	·012	+51	3	1,882	C. O. at Mango tree. See No. 499.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Sakinee	25·85	25	25	29·918	28·9	28·9	·020	3,788	433	4,221	
390	Bunékh-Khal	25·437	17·2	17·2	25·850	25	25	·040	+328	27	4,777	C. O. at Sakinee.
	Gidurasoo (15 ft. above village)	24,698	21·7	21·7	29·904	28·9	28·9	·035	4,948	534	5,482	
	Sakinee (2d)	25·752	15	13·3	24·698	21·7	21·7	·035	−1,124	84	4,274	C. O. at Gidurasoo.
	Asooee (village)	25·047	17·8	16·7	24·693	21·7	21·7	·019	−385	31	5,066	Do. do.
	Doongra	24,852	18·9	16·7	24·698	21·7	21·7	·014	−177	15	5,289	Do. do.
	Doongra-Khal	24·600	20·6	20	24·698	21·7	21·7	·005	+98	8	5,588	Do. do.
	Bungargaoñ	25·052	24·4	24·4	29·92	28·3	28·3	·019	4,603	515	5,123	
	Doomkot-Khal	24·248	13·3	11·7	25·088	24·4	24·4	·053	+830	63	6,016	C. O. at Bungargaon.
	Téka kee Mauda	24·042	13·3	13·3	24·962	6·1	6·1	·036	+1,017	42	6,182	
	Pauree (tent)	24·735	17·8	17·8	29·819	29·4	29·4	·058	4,810	484	5,294	
400	Do. Bungalo	24·871	10	10	24·83	10	10	..	−44	..	5,250	(a.) C. O. at tent. See Nos 322, and 472 to 481 inclusive; also No. 522.
	Bithuee (village)	26·27	18·8	16·2	24·83	10	10	·044	−1,423	79	3,762	(a.) C. O. at tent.
	Ford on Goree R	27·348	24·0	23·4	24·83	10	10	·070	−2,444	174	2,624	(a.) Do. do.
	Sirkot (village) 40 ft. below village	27·108	27·2	27·2	24·836	19·6	19·6	·038	−2,241	225	2,779	(a.) Do. do. See No. 411.
	Bugolee (village)	25·656	18·7	17·6	27·083	27·3	27·3	·044	+1,366	130	4,305	(a.) C. O. at Sirkot.
	Kuthoor (village)	26·064	21·7	21·7	27·083	27·3	27·3	·029	+970	103	3,873	(a.) Do. do.
	Kuméra Temple	26·434	22·4	21·2	27·083	27·3	27·3	·026	+606	60	3.449	(a.) Do. do.
	Churgaon (village)	26·561	15·2	14·3	27·020	12·3	9·6	·016	+462	29	3,279	(a.) Do. do.
	Buchelee (village)	27·368	18·6	18	27·020	12·3	9·6	·034	−309	16	2.456	(a.) Do. do.
	Junction of Sirkot and Goree Rs.	27·482	22·7	20·6	27·059	22·7	22·7	..	−405	37	2.328	(a.) Do. do.
410	Kotee (upper village)	26·628	25·8	24	27·083	27·3	27·3	·008	+434	46	3,269	(a.) Do. do.
	Sirkot (village)	27·077	25	25	29·802	31·1	31·1	·033	2,468	294	2,817	(a.) See No. 403.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centi grade.	Thermometers. Detached. Centi grade.					
			°	°		°	°					
	Kuthoolee (village)	25·372	16·1	16·1	29·87	28·9	28·9	·065	4,186	403	4,680	(a.)
	Goarkeea-Khal	24·152	18·9	15·3	25·404	16·7	16·7	·011	+1,328	98	6,135	(a.) C. O. at Kuthoolee.
	Boonga (tent)	26·130	18·9	18·9	29·765	28·3	28·3	·049	3,345	337	3,756	(a.)
	Sooar-Khal................	24·475	1[illegible]·6	15·6	26·255	28·3	28·3	·062	+1,763	164	5,721	(a.) C. O. at Boonga.
	Seemult (village)	25,624	22·2	20·6	24·475	15·6	15·6	·032	−1,161	90	4,445	(a.) C. O. at Sooar-Khal. See No. 448.
	Puhlee (tent)	24·220	21·7	21·7	29·744	28·3	28·3	·032	5,320	567	5,887	
	Murora, Bidolee (between villages) ...	25·77	27·2	27·2	29·802	29·4	29·4	·011	3,778	456	4,234	
	Tent 100 ft. above Tal (village)......	25·69	22·2	22·2	29·87	27·8	27·8	·029	3,899	417·5	4,316	
420	Rultum (village)	25·058	8·9	8·3	25·771	22·2	22·2	·066	+662	42·56	5,035	C. O. tent near Tal (a.)
	Koodh kee Séra Ghat	26·835	12·8	12·2	25·771	22·2	22·2	·051	−1,184·8	23·7	3,108	Do. do. (a.)
	Pang (Kumeen's house)	25·420	21·1	19·4	29·854	28·3	28·3	·037	4,152	423·6	4,667	(a.)
	Pinanee (village)	24·55	23·3	23·3	29·875	28·9	28·9	·027	5,086·5	566·4	5,653	
	Boorkhila-Khal	24·512	13·9	13·3	24·626	23·3	23·3	·046	+72	5·5	5,732	(a.) C. O. at Pinanee.
	Ookal (village)................	25·429	19·4	18·3	24 626	23·3	23·3	·020	857	76·96	4,700	(a.) Do. do.
	Sunee (25 feet above village)	25·663	28·9	23·9	29·780	29·4	29·4	·003	3,874	483	4,444	(a.)
	Seewala (village)................	24·52	18·3	18·3	25,663	28·9	28·9	·052	+1,132	115·6	5,717	(a.) C. O. at Sunee.
	Singar Déo ke Sera................	26·548	32·2	32·2	29·772	30	30	·013	2,998·5	398·08	3,465	(a.)
	Sookhra (village)................	24·913	25·5	22·2	25·781	27·8	27·8	·011	+881	95	5,229	(a.) C. O. camp near Murora. See No. 418.
430	Oolee (village)................	25·208	17·2	16·1	25·782	14·4	12·8	·015	+602	36·2	4.884	(a.) Do.
	Than (village)	25·207	17·2	16·1	25·782	14·4	12·8	·015	+603	36·2	4,886	(a.) Do.
	Rutkotee (village)	25·686	30	28·9	29·82	29·5	29·5	·003	3,891·5	487·6	4,379	
	Boonga (village)................	26·000	26·1	26·1	26·226	23·3	28·3	·011	+214	24·5	3,999	(a.) C. O. at Boonga camp. See No. 414.
	Water mill on Nyar R................	26·314	18·3	17·2	26·226	18·9	17·8	·003	−91	7	3,655	(a.) Do.
	Naee (village)	25·363	15·5	13·9	26·226	18·9	17·8	·017	+854	53·46	4,686	(a.) Do.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Doongree (village)	25·604	20·5	18·9	29·708	27·2	27·2	·034	3,838	377·2	4,299	(a.)
	Dang (village)	25·774	26·7	26·7	29·716	27·8	27·8	·096	3,702	429·76	4,214	(a.)
	Muloond (village)	25·193	15·5	15·	25·774	26·7	26·7	·056	+531	47·84	4,805	(a.) C. O. at Dang.
	Khundgaon (village)	25·300	19·5	18·3	25·774	26·7	26·7	·037	+445	40·5	4,710	(a.) Do. do.
440	Bunas (village)	25·214	12·8	12·8	24·330	21·7	21·7	·044	−975	72·24	4,819	(a.) C.O. at Puhlee. See No. 417.
	Naor (45 ft. above the village)	23·945	18·9	18·9	29·770	29·4	29·4	·050	5,619	578·4	6,197	
	Buréth (village)	24·082	17·2	16·7	24·065	18·9	18·9	·008	−27	1·42	6,168	(a.) C. O. at Naor tent.
	Tent near Sont	23·765	22·2	22·2	29·797	30·6	30·6	·040	5,850	660	6,640	(a.)
	Sont (village)	23·930	19·4	18·9	23·748	20·5	19·4	·005	205	15·3	6,416	(a.) C. O. at the tent.
	Koocholee (village)	23·337	22·2	22·2	29·754	31·4	31·4	·043	6,282	718·24	7,000	
	Putee-Khal	22·768	17·8	16·7	23·456	22·2	22·2	·020	+753	62·08	7,832	(a.) C. O. at Koocholee.
	Kirsal (the Punchukee)	24·944	21·7	21·7	29·754	31·4	31·4	·048	4,544	514·1	5,159	(a.)
	Tent 35 ft. above Puhlee (2d observation)	24·400	23·3	23·3	29·754	31·4	31·4	·040	5,127	597·87	5,839	(a.) The former observation gave 5,887 with best barometer. See No. 417.
	Silolee (village), Choprakot Purguna	25·000	27·8	27·8	29·754	31·4	31·4	·018	4,517	571·28	5,190	(a.)
450	Molka-Khal	23·385	16·1	14·5	29·77	31·7	31·7	·073	6,209	612·15	6,958	(a.)
	Kolee (village)	25·807	26·1	26·1	29·77	31·7	31·7	·029	3,693	456·62	4,233	(a.)
	Doongree (village)	25·030	26·1	25	29·77	31·7	31·7	·028	4,493	543·36	5,137	(a.)
	Goar (village), 1st	24·524	24·5	24·5	29·77	31·7	31·7	·035	5,014	601·34	5,728	(a.)
	Ridge between Doongree and Goar	23·506	18·9	18·3	24·524	24·5	24·5	·026	+1,076	98·44	6,926	(a.) C. O. at Goar.
	Nurkot (deserted village)	27·168	35·	35·	29·77	31·7	31·7	·020	2,401	339·66	2,795	(a.)
	Lolee (village)	26·096	21·1	20·	29·77	31·7	31·7	·055	3,377	371·52	3,823	(a.)
	Chutoora (20 ft. below the village)	25·862	31·7	31·7	29·777	31·7	31·7	..	3,673	497·69	4,254	(a.)

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Nowasoo (village)	25·028	23·3	23·3	29·777	31·7	31·7	·042	4,484	525·25	5,109	
	Pokree (village)	25·314	26·7	26·7	29.777	31·7	31·7	·025	4,205	525·6	4,835	(a.)
460	Goar (2d) 30 ft. below village	24·986	28·9	28·9	29·777	31·7	31·7	·014	4,556	590·85	5,250	(a.)
	Boodeesoo (village)	24·836	28·	28·	24·986	28·9	28·9	·004	+154	19·88	5,427	(a.)
	Bhynskot (30 ft. above village)	25·536	30·5	30·5	29·758	32·2	32·2	·009	3,977	532·1	4,599	(a.)
	Kotkee (village)	25·000	16·7	16·7	25·536	30·5	30·5	·069	+482	47·2	5,139	(a.) C. O. at Bhynskot.
	Jhala (village)	25·444	19·5	18·3	25·536	30·5	30·5	·056	+37	2·44	4,640	(a.) Do. do.
	Koltha (village)	25·686	23·3	21·7	25·536	30·5	30·5	·037	—190	20·88	4,384	(a.) Do. do.
	Bhutolee (village)	26·278	33·3	33·3	29·758	32·2	32·2	·007	3,246·5	451·26	3,772	(a.)
	Booganee (village)	25·874	21·7	19·5	26·278	33·3	33·3	·060	+344	36·96	4,160	(a.) C. O. at Bhutolee.
	Dewulgurh Temple	26·398	23·3	23·3	26·278	33·3	33·3	·053	—171	22·64	3,574	(a.) Do. do.
	Soomaree Hill	25·228	28·3	28·3	29·758	32·2	32·2	·019	4.283	552·66	4,932	(a.) See No. 210.
470	Julétha (village)	25·664	22·8	21·7	25·228	28·3	28·3	·028	—474	50·	4,398	(a.) C. O. at Soomaree Hill.
	Kholee (45 ft. above village)	26·772	26·7	26·7	29·758	32·2	32·2	·019	2,727	341·04	3,129	(a.)
	Paoree Bungalow (10 days mean)	24·872	26·7	26·7	29·672	30·9	30·9	·021	4,577	564·48	5,244	(a.)
	Do. (10 do.)	24·806	25·5	25·5	29·588	31·3	31·3	·029	4,563	553·8	5,219	(a.)
	Do. (10 do.)	24·790	25·5	25·5	29·625	30·8	30·8	·026	4,615	550·76	5,270	(a.)
	Do. (10 do.)	24·700	22·8	22·8	29·722	29·2	29·2	·031	4,790	533·	5,323	Best barometers. See Nos. 322, 400, and 522.
	Do. (15 do.)	24·704	23·3	23·3	29·673	30·8	30·8	·037	4,737·5	548·1	5,286	Do.
	Do. (16 do.)	24·721	23·3	23·3	29·645	29·5	29·5	·030	4,701·5	530·64	5,232	Do.
	Do. (15 do.)	24·745	23·3	23·3	29·717	30·	30·	·033	4,736	539·98	5,276	Do.
	Do. (16 do.)	24·693	22·2	22·2	29·566	30·	30·	·038	4,652	518·39	5,170	Do.
480	Do. (15 do.)	24·730	21·7	21·7	29·619	29·4	29·4	·038	4,661	507·45	5,168	Do.
	Do. (15 do.)	24·812	20·	20·	29·776	30·6	30·6	·053	4·752	513·59	5,266	Do.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitudes in Feet.	Remarks.
			°	°		°	°					
	Mean of the above	..	..	..	..	..	..	..	..	..	5,238	Best barometers. Mean of another month's observations, by my assistant, 5,270 feet.
	Sireenugur (the Bungalow)	27·948	30·	30·	24·685	20·6	20·6	·046	−3,186	344·08	1,708	C. O. at Paoree Bungalow.
	Do. (same observation compared with Calcutta)	27·918	30·	30·	29·75	31·1	31·1	·006	1,623	210·45	1,833	See Nos. 212 and 321.
	Mulétha (village)	27·818	30·	28·9	24·652	18·3	18·3	·037	−3,089	309·16	1,839	C. O. at Paoree.
	Banga (village)	26·311	27·8	27·8	29·75	29·5	29·5	·009	3,192	391·82	3,584	
	Teeargaon (village)	25·964	23·3	23·3	29·75	29·5	29·5	·032	3,515	396·	3,911	
	Chundurbudunee (tent) five days	23·318	19·5	19·5	29·797	28·9	28·9	·044	6,340	653·4	6,993	
	Do. (tent) three days	23·306	20·	20·	24·765	18·9	18·9	·005	+1,587	129·98	6,955	C. O. at Paoree.
	Chundurbudunee Temple	23·024	15·6	15·6	23·399	18·9	18·9	·015	+405	29 24	7,408	C. O. at tent. 7,408 is the mean altitude.
490	Naguee-Danda	24·23	15·5	12·8	24·736	17·2	17·2	·008	+520	33·	5,801	C. O. at Paoree.
	Hoonkot Peak	24·96	18·3	16·7	24·759	17·8	17·8	·002	−209	13·76	5,015	Do. do.
	Deoprag (rope bridge)	28·343	26·1	26·1	29·79	29·5	29·5	·019	1,280	152·9	1,433	
	The same compared with Paoree	28·343	26·1	26·1	24·800	18·3	18·3	·039	−3,439	326·34	1,473	C. O. at Paoree.
	Kapur (village)	26·700	26·1	26·1	24·777	21·7	21·7	·022	−1,925	196·	3,117	Do. do.
	Confluence of Nyar R. with Ganges R.	28·45	27·8	27·8	24·794	19·4	19·4	·042	−3,540	356·36	1,342	Do. do.
	Bhunaldoo (village)	26·340	24·5	24·5	24·804	19·5	19·5	·025	−1,540	145·2	3,553	Do. do.
	Deosee (village)	26·345	26·1	26·1	24·833	18·9	18·9	·036	−1,502·5	144·	3,591	Do. do.
	Dharee (village)	25·58	21·7	21·7	24·83	17·2	17·2	·022	−752	62·08	4,424	Do. do.
	Bilkhét (village)	28·007	24·5	24·5	29·91	27·8	27·8	·018	1,696·5	187·92	1,894	Do. do. See No. 388.
500	Tent near Buchelee village	26·158	22·8	22·8	24·861	15·	15·	·039	−1,285	103·95	3,849	Do. do.
	Dhour-Boonga Fort	24·736	15·	13·3	26·208	21·7	20·6	·033	+1,472	106·47	5,428	Do. at Buchélee.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

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		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Bhutgaon Temple	25·540	20·	20·	24·840	13·9	13·9	·030	−693	50·7	4,494	C. O. at Paoree.
	Bhudeear Ford, Nyár R.	27·956	11·7	10·	25·540	20·	20·	·046	−2·398	153·	1,943	Do. at Bhutgaon Temple.
	Puroolee (45 ft. above the village)	25·392	17·2	17·2	24·845	13·3	13·3	·019	−548	34·96	4,655	Do. at Paoree.
	Dang (50 ft. below village)	23·960	21·1	21·1	24·878	12·8	12·8	·041	−1,067	76·05	4,095	Do. do.
	Simtolee (50 ft. above village)	24·736	13·9	13·9	24·786	12·8	12·8	·005	+58	2·68	5,299	Do. do.
	Lumkhunee Peak	24·823	19·5	18·3	24·850	13·3	13·3	·031	+61	3·16	5,302	Do. do.
	Oophuraeen Peak	25·341	21·7	21·1	24·823	19·5	18·3	·011	−732	61·07	4,309	Do. at Lumkhunee P.
	Gungolee Ghat on Nyar R. (ford)	27·38	11·7	9·4	24·856	10·	10·	·008	−2,512	104·76	2,621	Do. at Paoree.
510	Masoñ (village)	26·688	22·2	22·2	24·858	13·3	13·3	·044	−1,805	136·29	3,296	Do. do.
	Punchoor Temple	24·603	13·3	13·3	24·807	12·8	12·8	·002	+212	1[illegible]·7	5,462	Do. do.
	Durasoo (village)	25·236	20·	20·	24·833	13·3	13·3	·033	−380	26·56	4,831	Do. do.
	Guwanee (village)	25·852	21·1	21·1	24·872	13·3	13·3	·039	−966	70·52	4,201	Do. do.
	Gooradour-Khal	24·142	11·1	9·5	24·888	13·9	13·9	·013	+779	38·61	6,056	Do. do.
	Deba (camp)	22·714	10·	10·	24·855	12·2	12·2	·010	+2.336	111·	7,685	Do. do.
	Do. do.	22·692	11·7	11·1	24·820	12·8	12·8	·005	+2,329	117·81	7,685	Do. do.
	Deba Temple	21·868	12·8	12·8	24·868	12·8	12·8	..	+3,350	183·04	8.771	Do. do.
	Do. do.	21·868	12·8	12·8	30·055	25·	25·	·054	8,222·5	663·39	8,886	
	Ghuneea-Khal	24·100	13·9	12·2	24·876	11·7	11·7	·011	+837	42·84	6,118	C. O. at Paoree.
520	Tulaen village on Lukhor R	26·093	16·9	16·9	24·853	11·1	11·1	·029	−1,239	74·2	3,925	Do. do.
	Liskot-Khal	23·573	10·5	8·9	24·842	10·5	10·5	..	+1,366	56·26	6,650	Do. do.
	Paoree Bungalow (thirty days mean)	24·781	18·9	18·9	29·833	28·9	28·9	·050	4,782	487·56	5,270	See Nos. 322, 400, and Nos. 472 to 481 inclusive.
	Bohwan Debee's Temple	25·518	17·2	17·2	30·082	22·8	22·8	·029	4,258	364·	4,622	
	Bunduran (village)	28·212	22·2	22·2	30·05	22·2	22·2	..	1,645	155·4	1,800	
	Mohan (30 ft. below the village)	28·528	20·5	20·5	30·05	22·2	22·2	·019	1,346	121·41	1,467	
	Dhékulee Guard Room	28·842	26·7	26·7	30·068	22·8	22·8	·023	1,105	116·09	1,221	

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			°	°		°	°					
	Chilkeea Mundee	28·992	26·1	26·1	30·076	22·8	22·8	·020	974	102·48	1,076	
	Huldooa	29·304	21·7	21·7	30·08	23·3	23·3	·009	672·5	65·25	738	
	Kasheepoor Bungalow (three days)	29·297	21·7	21·7	30·05	23·3	23·3	·010	652	63·	715	See Nos. 139 to 145 inclusive.
530	Rampoor (city)	29·45	22·2	22·2	30·024	23·3	23·3	·006	499	47·67	547	
	Peleebheet (twelve days mean)	29·464	18·3	18·3	30·075	21·7	21·7	·020	516·5	44·	560·5	See No. 594.
	Bundara	29·312	26·1	26·1	29·97	22·8	22·8	·020	595	61·	656	
	Biléhree Mundee	29·222	25·5	25·5	29·97	22·8	22·8	·016	672	69·89	742	
	Choonapanee	28·446	23·9	23·9	29·97	23·9	23·9	..	1,361	138·62	1,500	
	Timla Fort	26·158	13·3	11·7	28·474	11·7	10·	·009	2,219	102·6	3,821	C. O. at Choonapanee.
	Kela Ghat	27·856	26·7	26·7	29·96	25·1	25·1	·010	1,907	209·79	2,117	
	Budolee	26·122	18·9	18·9	29·99	25·1	25·1	·027	3,571	336·6	3,908	
	Kundulgaon (30 ft. below village)	24·844	15·5	15·5	29·97	26·7	26·7	·066	4,819	434·66	5,254	
	Lohoo-Ghat (Capt. M'Harg's house) three days	24·507	12·2	12·2	29·94	25·5	25·5	·065	5,148	413·6	5,562	
540	Phurka (Bungalow)	24·174	10·	10·	29·84	27·2	27·2	·083	5,397	429·66	5,827	
	Fort Hastings	23·808	6·7	5·5	24·438	12·2	12·2	·026	+652	26·04	6,240	C. O. at Lohoo Ghat.
	Deo-Dhoora (Bungalow)	23·402	7·2	7·2	29·964	24·5	24·5	·081	6,352	428·18	6,780	(G. 6,742.)
	Darmee (tent)	25·678	15·5	15·5	29·964	24·5	24·5	·046	3,976	340·	4,316	
	Darmee (village)	25·416	8·9	7·2	25·682	12·8	12·8	·020	+250	10·	4,576	C. O. at Tent.
	Jak (80 ft. above village)	24·526	15·5	15·5	30·09	22·8	22·8	·036	5,290	433·92	5,724	
	Hawul Bagh (Mr. Traill's house) six days	26·083	22·2	22·2	29·972	26·7	26·7	·023	3,599	377·3	3,976	(G. 3,961.) See No. 90.
	Dhamus (village)	25·384	23·3	23·3	29·99	28·3	28·3	·025	4,320	477·3	4,797	
	Doba (50 ft. below village)	26·034	25·	25·	29·97	29·5	29·5	·023	3,646	152·32	3,798	
	Munursa (100 ft. below village)	26·444	25·	25·	30·02	28·3	28·3	·017	3,288	372·4	3,660	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
550	Nougaon (village)	26·588	27·2	27·2	30·05	29·5	29·5	·012	3,178	384·88	3,563	
	Kankur Ghat Tree..................	26·960	27·2	27·2	26·588	27·2	27·2	..	−303	32·64	3,227	C. O. at Nougaon.
	Boojan (30 ft. below village)	27·206	27·8	27·8	30·06	28·9	28·9	·006	2,594	314·13	2,908	
	Punt kee Peepul....................	27·458	27·8	27·8	30·04	28·9	28·9	·006	2,336	283·	2,619	
	Dubra (village)	28·124	28·3	28·3	29·97	29·5	29·5	·007	1,650	202·3	1,852	
	Khyralee Peepul Tree	28·196	30·5	30·5	29·96	28·9	28·9	·010	1,591	201·96	1,793	
	Kath kee Nao (tent) 4 days...........	25·477	25·5	25·5	29·895	29·5	29·5	·020	4,146·5	486·75	4,633	
	Kath kee Nao (the fort)..............	25·216	18·3	16·7	25·492	20·5	18·3	·011	+272	20·	4,925	C. O. at tent. (G. 5,073.)
	Khutolee (village)	26·136	25·	25·	29·92	30·	30·	·026	3,497	412·5	3,910	
	Phulsoñ (40 ft. below village)........	25·720	26·7	26·7	29·90	30·5	30·5	·020	3,904	477·62	4,382	
560	Cheoonee..........................	25·496	28·3	28·3	29·86	31·1	31·1	·014	4,103	519·75	4,623	
	Tent near Choumoonh Temple (two days)	24·199	26·1	26·1	29·84	30·5	30·5	·021	5,437	656·6	6,094	
	Choumoonh Temple	23·904	18·3	17·2	24·106	18·3	17·2	..	+219	15·48	6,328	C. O. at tent. (G. 6,428.)
	Jyna (village)......................	24·664	26·1	26·1	29·83	30·5	30·5	·022	4·931	597·13	5,528	
	Mundulakot (village)................	25·418	28·3	28·3	29·83	30·5	30·5	·011	4,159	523·32	4,682	
	Poondolee (village)	24·772	26·1	26·1	29·80	30·5	30·5	·022	4,793	580·15	5,373	
	Pujéna (100 ft. above village)........	25·433	23·9	23·9	29·860	28·9	28·9	·025	4,151	467·28	4,618	
	Shér Temple........................	24·520	15·	13·9	25·486	22·8	21·1	·035	+967	71·75	5,657	C. O. at Pujéna tent.
	Gadee (30 ft. above village)	25·096	22·2	22·2	29·87	28·3	28·3	·030	4,507	493·44	5,000	
	Butouleea	24·268	22·8	22·8	29·83	28·9	28·9	·030	5,388	593·4	5,981	
570	Réonee Temple.....................	23·672	18·3	16·7	24·198	21·1	21·1	·013	+559	45·36	6,586	C. O. at Butouleea. (G. 6,599.)
	Kaleemuth Tree	23·780	18·9	18·3	29·806	30·5	30·5	·056	5,823	607·56	6,431	(G. 6,489.) See Nos. 69 and 85.
	Bañslee Seera (30 ft. below village)...	26·105	31·1	31·1	29·87	31·1	31·1	..	3,511	466·5	3,977	See No. 733.
	Sooreh Temple (at tent 40 ft. below) ..	25·872	29·5	29·5	29·76	30·5	30·5	·005	3,643	468·	4,111	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Nyatbana Tree (three days)	24·435	26·1	26·1	29·817	31·1	31·1	·024	5,161	629·2	5,790	(G. 5,857.)
	Kuthol Khét	24·412	29·5	29·5	29·82	31·1	31·1	·008	5,206	672·66	5,879	
	Dwara-hath (the tank)	25·236	30·5	30·5	29·90	30·5	30·5	..	4,419	576·45	4,995	
	Doona-giree Temple (two days)	23·092	20·5	20·5	29·857	30·5	30·5	·046	6,643	724·2	7·367	(G. 7,344)
	Punchukee at junction of Kothar N. with Ramgunga R.	26·696	33·9	33·9	29·857	30·5	30·5	·020	2,933	405·72	3,339	
	Turag Tal	26·668	31·1	31·1	29·79	30·5	30·5	·004	3,482	458·92	3,941	
580	Loba (tent) two days	24·953	32·2	32·2	29·735	31·1	31·1	·007	4,575	619·36	5.194	
	Loba Gurhee	23·946	21·7	21·1	25·000	27·2	26·7	·026	+1,094	112·33	6,401	C. O. at tent (G. 6,430.)
	Khétee-Malsee (large mulberry tree on Khétee R.	24·996	28·3	28·3	29·77	31·1	31·1	·014	4,540	576·18	5,116	
	Dewalee-Khal	23·186	12·2	10·	24·996	28·3	28·3	·074	+1,876	152·8	7,145	C. O. at Khétee-Malsee.
	Kañsooa (tent about 150 ft. below village)	25·832	32·8	32·8	29·84	31·1	31·1	·010	3,767	510·4	4,277	
	Adh-Bhudree Temple	25·888	18·3	18·3	25·862	29·5	28·3	·058	—85	6·99	4,185	C. O. at Kañsooa tent.
	Notee Temple	24·704	29·4	29·4	29·79	31·1	31·1	·008	4,871	631·18	5·502	See No. 643.
	Jak (village)	25·372	32·2	32·2	29·76	31·1	31·1	·007	4,162	562·48	4,724	
	Bhutgoalee (about 100 ft. below village)	23·624	25·5	25·5	29·70	31·7	31·7	·029	5,933	726·44	6,659	
	Goor Choura	23·700	26·1	26·1	29·76	31·1	31·1	·023	5,908	720·72	6,629	
590	Tilkhunee-Khal	22·114	13·3	11·7	23·834	23·9	23·3	·047	+1,896	141·75	8,707	C. O. at Goor-Choura (a.)
	Dobree (village 50 ft. below Copper Mine)	22·698	13·3	12·8	22·114	13·3	11·7	..	—679	35·38	7,979	C. O. at Tilkhunee-Khal (the Copper Mine about 50 ft. higher.) (a.)
	Roodurpoor (three days)	29·395	20·	20·	30·067	22·2	22·2	·013	577	53	630	This observation from Mr. Tate's Field Book.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer	Observation. Thermometers. Attached (Centigrade)	Observation. Thermometers. Detached (Centigrade)	Comparison. Barometer	Comparison. Thermometers. Attached (Centigrade)	Comparison. Thermometers. Detached (Centigrade)	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Barelly (fourteen days)	29·476	17·2	17·2	29·986	18·9	18·9	·010	438	32	470	This observation from Mr. Tate's Field Book.
	Péleebheet (three days)	29·482	18·3	18·3	30·04	20·	20·	·010	479	38	517	Do. See No. 531.
	Nanukmuth (two days)	29·402	18·9	18·9	30·11	20·5	20·5	·009	612	51	663	Do. See No. 133.
	Kaldoonga, (village, 50 ft. above Ghagra R.)	28·932	23·9	23·9	30·07	21·7	21·7	·013	1,017	98	1,115	Do.
	Dhurm Ghat, on Kalee R. (?)	28·600	22·8	22·8	29·93	26·1	26·1	·019	1,167	122	1,289	Do.
	Joola Ghat, ditto	28·276	23·9	23·9	30·09	22·8	22·8	·007	1,627	161	1,788	Do.
	Junction of Goree and Kalee Rivers	28·01	22·8	22·8	30·02	27·2	27·2	·025	1,782·5	190	1,972	Do.
600	Pethora Gurh	24·813	20·	20·	30·05	29·5	29·5	·047	4,941	521	5,462	Do.
	Ram Ghar (store room)	25·190	21·1	21·1	29·87	29·5	29·5	·042	4,397	476	4,873	Do.
	Tamlee Pepul Tree	26·055	18·3	18·3	29·97	26·7	26·7	·044	3,604	346	3,950	Do.
	Birhm Deo (guard room) two days	29·208	19·5	19·5	30·06	22·8	22·8	·019	733	65	798	Mr. Tate's observations end.
	Dharee (village)	27·555	28·3	27·2	29·97	30·6	30·6	·013	1,895	234	2,129	
	Rope Bridge on Ganges R. near do.	27·920	26·7	25·6	27·762	27·8	27·2	·006	−153	4	1,969	(a.) C. O. at Dharee.
	Bansee (village)	26·554	24·4	23·9	29·97	29·4	29·4	·026	3,128	354	3,482	
	Doongra Rice Fields	26·456	21·4	23·9	29·97	29·4	29·4	·026	3,224	367	3,591	
	Choura Khal	25·104	16·1	14·4	26·580	16·1	14·4	..	+1,489	91	5,093	(a.) C. O. at Bansee.
	Kanda (village)	26·648	25·6	25·	29·94	29·4	29·4	·020	3,015	351	3,366	
610	Ghéngur Khal, or Mol Khal	25·030	17·8	16·7	26·684	25·6	23·9	·039	+1,628	140	5,169	(a.) C. O. at Kanda.
	60 ft. above junction Gudhoolee and Mundagnee Rivers	27·527	26·1	26·1	29·96	29·4	29·4	·018	2,190	259	2,449	
	20 ft. below Agustmoondee Temple	27·428	23·3	23·3	29·98	29·4	29·4	·031	2,286	255	2,541	See No. 219.
	100 feet below Kundara	25·898	23·9	22·8	29·96	29·4	29·4	·029	3,768	418	4,186	
	Naluhputun (tent)	25·192	21·7	21·7	29·96	28·9	28·9	·036	4,479	483	4,962	
	Do. (station)	24·890	19·4	18·9	25·250	20·	20·	·003	+371	31	5,372	(a.) C. O. at Naluhputun tent.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
		"	°	°		°	°					
	Gooput-Kasee Temple	25·584	16·7	15·6	25·320	19·4	18·3	·014	−285	20	4,651	(*a.*) Do.
	Nahhputun Temple	25·532	19·4	18·3	25·262	20·6	20·6	·006	−284	23	4,649	(*a.*) Do. See No. 234.
	Purkundee (camp)	25·61	22·2	22·2	29·98	28·9	28·9	·034	4,070	441	4,511	See No. 620.
	Ookee Muth, or Oolkee Muth	25·830	13·3	13·3	25·682	20·	20·	·035	−185	13	4,309	(*a.*) C. O. at Camp. See No. 235.
620	Purkundee (village)	25·564	11·7	10·6	25·616	11·7	10·	..	+53	1	4,366	(*a.*) Do. See No. 618.
	Julaee (village)	25·918	12·8	12·2	25·616	11·7	10·	·006	−299	13	4,193	(*a.*) Do.
	Jagoth (about 120 ft. below village)	25·193	21·7	21·7	30·02	28·9	28·9	·036	4,530	491	5,021	
	Oorkolee (village)	24·680	22·2	22·2	30·02	28·9	28·9	·033	5,070	553	5,623	
	Bawéh (about 140 ft. above village)	25·498	20·6	20·6	30·07	29·4	29·4	·045	4,251	455	4,706	
	Seopooree (30 ft. above village)	25·686	21·1	21·1	30·03	30·	30·	·045	4,026	440	4,466	
	Chapur (village)	26·042	21·7	21·7	30·06	29·4	29·4	·040	3,699	404	4,103	
	Agurgaon (about 60 ft. above village), two days	23·375	15·6	15·6	29·93	28·9	28·9	·063	6,414	608	7,022	
	Agur Peak	22·776	13·9	11·7	23·522	17·2	15·	·015	+823	47	7,909	(*a.*) C. O. at Tent. See No. 303.
	Choundee (village)	25·401	17·8	17·8	29·97	30·	30·	·062	4,247	433	4,680	
630	Bamun-Thula (30 ft. above village)	24·406	17·2	16·1	30·06	28·9	28·9	·057	5,369	515	6,002	(*a.*)
	Gogulee (30 ft. below village)	25·008	16·7	16·1	30·07	29·4	29·4	·063	4,738	471	5,313	(*a.*)
	Alee (village)	24·62	16·7	15·6	30·13	29·4	29·4	·062	5,197	499	5,810	(*a.*)
	Masoñ (village)	27,213	22·8	22·2	30·13	28·3	28·3	·030	2,624	282	2,964	(*a.*)
	Nund, Prag	27·262	16·1	14·4	27·124	18·9	18·3	·015	−146	10	2,805	(*a.*) C. O. at Masoñ. See No. 164.
	Bucher (village)	24·728	17·8	17·8	30·09	26·7	26·7	·044	5,068	480	5,548	
	Booransee Peak	22·118	7·2	6·1	24·768	19·4	18·3	·054	+2,885	150	8,644	(*a.*) C. O. at Buchér.
	Gopésur (tent)	25·315	18·3	18·3	30·10	26·1	26·1	·045	4,466	422	4,888	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

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		Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.					
			°	°		°	°					
	Gopésur Temple	25·392	15·6	13·9	25·318	15·6	15·	..	−75	4	4,807	(a.) C. O. at Tent. See Nos. 242 and 293.
	Peepulkotee (Peepul Tree)	25·841	17·8	17·8	30·11	25·6	25·6	·042	3,942	365	4,307	See Nos. 244 and 290.
640	Doongree (village)	25·082	18·3	17·8	30·11	26·7	26·7	·042	4,717	448	5,268	(a.) See No. 291.
	Junction of Birhei Gunga	26·612	15·6	14·4	25·830	16·1	16·1	·003	−780	50	3,460	(a) C. O. at Peepulkotee.
	Bydana (Peepul Tree)	27·384	18·9	18·9	30·04	25·	25·	·034	2,379	221	2,652	(a.)
	Kurn Prag Tent (about 50 ft. above Spar Bridge)	27·512	17·2	17·2	30·015	24·4	24·4	·040	2,231	200	2,480	(a.) See Nos. 165 and 149.
	Notee Temple	24·752	12·8	12·8	30·03	23·9	23·9	·055	4,979	390	5,369	See No. 586.
	Upper Pindooalnee (30 ft. below village)	23·909	13·9	12·8	30·02	23·9	23·9	·048	5,878	459	6,337	
	Koocholee (village)	23·462	15·6	13·9	30·05	23·9	23·9	·039	6,405	516	7,059	(a.)
	Ootelgudhree-Khal	21·368	3·9	3·9	23·392	15·6	13·9	·050	+2,296	87	9,489	(a.) C. O. at Koocholee.
	Murora (about 100 ft. below village)	24·152	16·7	16·7	30·06	23·3	23·3	·032	5,664	484	6,148	
	Chak-Khal	22·524	11·1	10·0	24·234	16·7	16·7	·025	+1,877	109	8,273	(a.) C. O. at Murora Tent.
650	Kunoor (lowest house)	24·276	16·1	16·1	30·08	23·3	23·3	·035	5,549	467	6,016	See No. 332.
	Kunoor Than	24·130	14·4	12·8	24·364	16·1	16·1	·008	+242	14	6,277	(a.) C. O. at Kunoor.
	Rundola Ghat on Sanee R. (or ford)	25·324	4·4	3·3	24·364	16·1	16·1	·060	−1,069	44	4,881	
	Meldhar (tent about 200 ft. below village)	24·676	17·8	17·8	30·07	22·8	22·8	·024	5,126	445	5,682	(a.)
	Lower Byrgaon (village)	25·212	16·1	16·1	30·07	23·3	23·3	·036	4,554	384	5,037	(a.)
	Oopren-Khal	24·000	12·2	11·1	25·142	16·1	16·1	·019	+1,191	69	6,322	(a.) C. O. at Byrgaoñ.
	Chukurgaon (50 ft. below village)	25·052	16·	16·	30·01	23·3	23·3	·036	4,669	390	5,059	
	Jooneea (40 ft. below village)	24·110	16·1	15·6	30·025	22·8	22·8	·032	5,683	467	6,150	
	Do. Fort	23·568	5·6	3·3	24·156	15·6	14·4	·047	+590	21	6,753	(a.) C. O. at Tent.
	Masoñ (about 80 ft. below village)	25·538	20·	18·9	30·10	22·8	22·8	·014	4,269	379	4,741	(a.)
660	Muthela (40 ft. above Sanee R.)	25·936	17·2	16·7	30·07	22·8	22·8	·029	3,824	321	4,145	(a.)
	Juwaee (village)	25·430	12·8	11·1	25·862	11·7	10·6	·006	+445	19	4,618	(a.) C. O. at Muthela Tent.
	Sookhaee (village)	25·482	12·8	11·7	25·862	11·7	10·6	·006	+392	19	4,564	(a.) Do. Do.

Altitudes of Places and Stations in Kumaon, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet	Remarks.
		Barometer.	Thermometers. Attached. Centi grade.	Thermometers. Detached. Centi grade.	Barometer.	Thermometers. Attached Centi grade.	Thermometers. Detached. Centi grade.					
			°	°		°	°					
	Séra (village)	26·096	16·1	15·6	30·10	22·2	22·2	·032	3,688	297	3,985	
	Bungar (village)	26·086	13·9	12·2	26·124	16·1	15·6	·011	+27	1	4,013	(a.) C.O. at Séra.
	Choundul (60 ft. below village)	25·802	16·7	15·6	30·07	22·2	22·2	·029	3,959	319	4,363	(a.)
	Pukholee (village)	25·856	13·9	13·9	30·06	22·8	22·8	·047	3,879	304	4,266	(a.)
	Deokhar (30 ft. above village)	25·370	13·9	13·9	30·07	23·3	23·3	·048	4,379	348	4,633	(a.)
	Bhoun (30 ft. below village)	25·57	13·3	13·3	30·06	21·7	21·7	·043	4,172	313	4,574	(a.)
	Puthaotee (40 ft. below village)	26·216	15·6	15·6	30·08	21·7	21·7	·032	3,551	283	3,911	(a.)
670	Loénteea	27·252	17·2	16·1	30·06	20·6	20·6	·019	2,537	355	2,989	(a.)
	Confluence Khulee and Mundal Rivers	28·236	15·6	15·6	30·06	20·	20·	·025	1,608	121	1,763	(a.)
	Duhurgaon (about 80 ft. below village)	26·460	15·6	15·6	30·11	20·	20·	·023	3,344	255	3,670	(a.)
	Seerana (60 ft. below village)	25·684	16·7	15·6	30·08	18·9	18·9	·011	4,106	301	4,495	(a.)
	Kolee (70 ft. below village)	25·72	15·6	15·6	30·05	18·3	18·3	·014	4,040	292	4,419	(a.)
	Oonéree (30 ft. below village)	25·486	14·4	13·9	30·06	18·9	18·9	·023	4,278	300	4,578	
	Muneeargaon (about 90 ft. below village)	25·26	14·4	13·3	30·07	20·	20·	·029	4,512	320	4,832	
	Ushnkhet (about 120 ft. below village)	26·506	14·4	13·9	30·11	19·4	19·4	·026	3,296	234	3,601	(a.)
	Choondaee (about 100 ft. below village) on Mydee R.	27·082	14·4	13·9	30·12	19·4	19·4	·027	2,744	194	2,997	(a.)
	Soormaree (about 60 ft. below village)	26·683	16·1	16·1	30·12	19·4	19·4	·018	3,139	239	3,445	(a.)
680	Seela (village)	26·974	16·1	16·1	30·14	20·6	20·6	·024	2,869	223	3,092	
	Danda-Mundee	27·30	17·2	17·2	30·13	21·7	21·7	·025	2,546	210	2,811	(a.) See No. 381.
	Bureth (about 100 ft. below village)	25·918	15·	15·	30·13	22·2	22·2	·037	3,886	309	4,278	(a.)
	Chopura (lower village)	27·509	17·2	17·2	30·15	23·3	23·3	·034	2,357	202	2,610	(a.)
	Do. (upper village)	26·456	11·7	11·1	27·372	15·	15·	·017	+870	48	3,546	(a.) C. O. at lower village.
	Timlee	27·182	17·8	17·8	30·11	23·9	23·9	·033	2,634	233	2,924	(a.)
	Kuthoor	26·158	15·6	15·6	30·11	23·3	23·3	·040	3,626	301	4,005	(a.)
	Junction of Timlee and Heonla Rivers (tree)	28·222	8·9	8·3	26·088	15·6	15·6	·038	−2,084	106	1,772	(a.) C. O. at Kuthoor.

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation.			Comparison.			Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.		Remarks.
		Barometer	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.	Barometer.	Thermometers. Attached. Centigrade.	Thermometers. Detached. Centigrade.						
			°	°		°	°						
	Ghunsalee (25 ft. above village)	25·698	14·4	14·4	30·10	23·3	23·3	·045	4,075	327	4,490	(a.)	
	Tolee-Khal	25·266	14·4	14·4	25·628	14·4	14·4	..	+370	22	4,890	(a.)	C. O. at Ghunsalee.
690	Bhumolee	25·602	15·	13·9	30·08	23·3	23·3	·042	4,157	331	4,578	(a.)	
	Kothar	26·230	13·3	13·3	25·532	15·	13·9	·009	−712	41	3,810	(a.)	C. O. at Bhumolee.
	Saor (about 60 ft. below village)	26·242	16·7	16·7	30·06	23·9	23·9	·038	3,502	304	3,806		
	Keecha-Gurhee	23·974	10·	10·	30·08	23·9	23·9	·067	5,840	423	6,388	(a.)	
	Bursooree (30 ft. below village)	25·642	16·7	15·	30·08	23·9	23·9	·037	4,122	341	4,463		
	Oolna (30 ft. below village)	26·288	15·	15·	30·07	23·9	23·9	·047	3,455	287	3,817	(a.)	
	Murora Ghat on Nyar R.	28·448	13·9	13·3	26·218	15·	15·	·006	−2,133	128	1,511	(a.)	C. O. at Oolna.
	Oojargaon	26·282	17·2	17·2	30·05	23·9	23·9	·036	3,455	303	3,833	(a.)	
	Bungaon	25·157	15·	15·	29·98	23·9	23·9	·045	4,524	324	4,996	(a.)	
	Binsur-Khal	24·262	11·1	10·6	25·104	16·7	16·7	·027	+860	50	5,924	(a.)	C. O. at Bungaon.
700	Musangaoñ (60 ft. above village)	25·732	13·3	13·3	29·97	23·9	23·9	·055	3,918	311	4,314	(a.)	
	Kanda	25·442	10·	9·4	29·94	23·3	23·3	·068	4,032	282	4,400	(a.)	
	Kot	25·450	9·4	9·4	25·372	10·	9·4	·003	−83	3	4,312	(a.)	C. O. at Kanda.
	Khola	25·078	10·	10·0	29·95	23·3	23·3	·066	4,557	325	4,980	(a.)	
	Kuthoor	25·314	6·7	5·6	25·008	10·	10·	·017	−335	11	4,627	(a.)	C. O. at Khola.
	Simna	25·632	12·8	12·2	30·00	22·8	22·8	·051	4,049	303	4,439	(a.)	
	Sulda (about 100 ft below village)	25·662	13·9	13·9	30·10	21·7	21·7	·040	4,117	313	4,519	(a.)	
	Mujeen Temple	26·514	19·4	19·4	30·05	21·7	21·7	·012	3,250	283	3,604	(a.)	
	Keeark Temple	25·826	19·4	19·4	30·01	21·1	21·1	·009	3,904	337	4,326	(a.)	
	Kaloñgaon	25·07	22·8	21·1	30·01	26·7	26·7	·019	4,668	476	5,247	(a.)	
710	Putaoteea (on Kal-gudh R.)	24·67	21·7	20·	30·01	26·7	26·7	·024	5,081	508	5,700	(a.)	
	Gudéree (about 160 ft. below village)	25·004	22·8	21·7	30·02	27·2	27·2	·022	4,741	497	5,343	(a.)	
	Gudéree-Khal	22·714	16·1	13·3	24·934	22·8	21·7	·030	+2,396	179	7,965	(a.)	C. O. at Guderee Tent.
	Chumnaon	25·38	20·	20·	30·06	27·8	27·8	·040	4,369	445	4,910	(a.)	
	Kanda	26·096	23·9	23·9	30·03	29·4	29·4	·029	3,630	412	4,123	(a.)	

Altitudes of Places and Stations in Kumaoñ, deduced from Barometrical Observations.

No.	Place of Observation.	Observation. Barometer.	Observation. Thermometers. Attached. Centigrade.	Observation. Thermometers. Detached. Centigrade.	Comparison. Barometer.	Comparison. Thermometers. Attached. Centigrade.	Comparison. Thermometers. Detached. Centigrade.	Equation for Expansion + to coldest Barom.	Approximate Altitude, in Feet.	Equation for Temperature, in Feet, +	Absolute Altitude, in Feet.	Remarks.
			°	°		°	°					
	Kubura	26·854	20·	20·	30·	28·3	28·3	·045	2,844	292	3,199	(a.)
	Byalee	26·82	15·	13·9	29·95	28·9	28·9	·075	2,803	257	3,121	(a.)
	Kulwaree (upper houses of village)	25·62	20·6	20·6	29·86	27·8	27·8	·037	3,953	409	4,449	(a.)
	Dang	26·096	20·	20·	29·96	27·8	27·8	·040	3,558	363	3,999	(a.)
	Junction of Lukhor and Nyar Rivers	26·714	13·3	13·3	26·026	20·	20·	·036	−715	50	3,219	(a.) C. O. at Dang.
720	Pursolee (25 ft. above village)	26·20	20·	20·	30·08	26·1	26·1	·032	3,567	350	3,995	(a.)
	Aoléth (50 ft. below village)	26·084	21·1	21·1	30·05	26·1	26·1	·026	3,662	368	4,111	(a.)
	Khurgeth Peak	25·59	17·2	17·2	30·05	27·2	27·2	·051	4,134	393	4,617	(a.)
	Junction of Nyr and Ramgunga Rivers	27·81	18·3	18·3	29·99	27·2	27·2	·05	1,920	186	2,148	(a.)
	Indola (60 ft. below village)	27·023	17·2	17·2	29·95	25·6	25·6	·045	2,636	240	2,933	(a.)
	Sukneeana (80 ft. below village)	25·468	17·2	17·2	29·87	27·8	27·8	·054	4,100	394	4,584	(a.)
	Bikeea kee Syn	27·385	26·7	26·7	29·91	26·7	26·7	..	2,299	262	2,612	(a.)
	Junction of Khutron and Ramgunga Rivers	27·174	25·	25·	29·82	28·3	28·3	·018	2,404	271	2,728	(a.)
	Séonath Temple on Ramgunga R.	27·176	25·6	25·6	29·87	26·1	26·1	·003	2,461	271	2,787	(a.) Near Masee.
	Chour	25·617	20·6	20·6	29·77	27·2	27·2	·034	3,880	397	4,362	(a.)
730	Teepoula (30 ft. below village)	27·076	25·	25·	29·85	29·4	29·4	·024	2,518	294	2,868	(a.) (G. 2978.)
	Budhan (40 ft. below village)	24·966	23·3	23·3	29·86	28·9	28·9	·028	4,635	517	5,255	(a.)
	Dhunguleea	24·86	22·8	22·8	30·02	30·	30·	·036	4,877	552	5,538	(a.)
	Réonee Village (Byroob's Temple)	24·404	16 7	17·2	24·790	22·8	22·8	·030	+377	32	5,955	(a.) C. O. at Dhunguleea.
	Banslee Seera	26·406	28·3	28·3	30·03	30·	30·	·009	3,342	402	3,817	(a.) See No. 572.
	Lodh (40 ft. below village)	25·192	21·7	21·7	29·95	29·4	29·4	·038	4,468	486	5,053	(a.)
	Byznath Temple	26·405	26·1	26·1	29·97	30·6	30·6	·024	3,277	396	3,746	(a.) (G. 3614.) See No. 79.
	80 ft. above junction of Chiringa and Pindur Rivers	25·934	26·7	26·7	29·98	30·6	30·6	·020	3,757	458	4,299	(a.)
	Budhan Gurh (fort)	22·492	20·	20·	29·985	30·6	30·6	·048	7,437	805	8,242	

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